# COAL AGE

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## *Old Laws and New Economics*

PROGRESS toward stabilization in the bituminous coal industry is again challenged by the uncertainties of our antiquated anti-trust laws. Organizing under a plan approved by a former assistant to the Attorney General who was in charge of prosecutions under the Sherman Act during the Coolidge administration, sponsors of the regional selling agency program are informed that the Department of Justice questions the legality of their proposals.

FORTUNATELY, the coal executives promoting Appalachian Coals, Inc., are not only ready to meet the challenge but have taken steps to force the issue. The government has indicated its intention of invoking the law to prevent the new agency from functioning; the operators express a willingness to encourage such an appeal so that there may be the speediest possible determination of the issues by the courts.

PENDING action by the Supreme Court, it is announced that Appalachian Coals, Inc., will make no attempt to function as a sales agency. Such a decision, of course, is readily understandable. But it would be unfortunate, indeed, if this necessary policy of marking time in the Southern high-volatile fields were seized upon as an excuse to justify a halt in preliminary organization work in those districts or elsewhere in the bituminous regions.

TO ABANDON active consideration of the many complex problems which must be solved before the plan can be brought to the point of readiness for successful operation in any district would be an inglorious waste of golden hours. By not abandoning such endeavors, districts favoring the regional selling agency would be in a position to swing quickly into action when, and if, a favorable decision on the legal points is handed down.

EVEN WERE the decision adverse, the time spent in interim consideration would not have been lost, because the better understanding of the picture of the district as a whole that each individual would have gained could not be otherwise than beneficial. And, more important, each individual would be better qualified to support effectively the demand for modification of a body of law which denied him opportunity for economic stability—but not at the price named in the Davis-Kelly bill, thank you.

# MODERN COAL P

## + From the Consumers' Standpoint



### I . . The Retailer

IN ANY comment or discussion of the future of coal, we, who are closest to the subject, are prone to view present-day conditions as compared to those of old, losing sight of the fact that competition was entirely within a very unprogressive industry not so many years ago. We "point with pride" to the great improvements in sizing and preparation of the last twenty years. Doubtless, in many cases we should, as much progress has been made.

But when "you're seeing things at night," as much of the industry is at present, it is well to look both ways, particularly forward. It is a far cry from the ¼-in. lump of the nineties to the various sizes of today, but with the keen competition both within and without the coal industry, it does not seem that enough emphasis can be put on sizing and preparation of present-day coals, whether for steam or domestic use. With the advent of the stoker we may look for a variety of sizes and preparations much more complex than those with which we are familiar, as proper sizing has much to do with efficiency and freedom from trouble in stoker firing.

Twenty-five years ago, when hard coal was the predominant fuel east of the Mississippi, a complaint about preparation made to a shipper of anthracite often brought the reply that, according to Pennsylvania law, a certain allowable content of slate and bone was permitted in merchantable coal. This was very true and very legal, but proved to be poor business. The public had its own ideas and, as with prohibition, frequently raised the voice of protest. Protest being of no avail, the householder often sought another fuel and was quite ready to accept a substitute when offered.

Any retailer who mingled with his Eastern brothers could be sure that the first discussion of business problems would start the perennial complaint of the "pea coal in the chestnut" and how to overcome the dissatisfaction of the consumer. But today, behold, anthracite no longer contains slate and bone; its impurity is squeezed down to the inherent ash. And chestnut *is* chestnut, not pea coal.

But why recite the too long delayed but well learned lesson of the anthracite industry? Simply because it seems to point a creed that all the bituminous operators might profitably adopt: proper sizing and purity of product, for the public will accept no less.

I recall a Franklin County (Illinois) producer of fifteen years ago who was bothered, as they all were, with a surplus of 3x2-in. nut. To see if he could change the situation he put it through a roller screen, breaking off the corners till it was about as round as marbles, and naught remained but firm coal. In less than a year demand for that size was brought up to production. Both he and his trade were pleased. Yes, he did make some more small coal, but he got full price for all of his 3x2 and no longer had to apply it on his low-priced railroad business.

A year or so back, the Pocahontas field attempted to "standardize" its sizes. A laudable ambition, but, as I see it, poorly carried out, because the buyer was given little or no voice in the matter. In arriving at the sizes to be made, more attention seemed to be paid to the adoption of sizes which would necessitate the fewest changes in screens then on hand at the various operations, rather than a study of what the consumer desired and would pay a price for. The result has been, and will continue to be, a drifting away from that standardization.

Proper sizing is essential if the best prices are to be obtained, but standard sizing does not necessarily accomplish proper sizing. The buyer must be considered.

To promote greater heating satisfaction with solid fuels is the aim of the Committee of Ten, and to this end the retail trade is urged to acquaint itself with the causes of improper

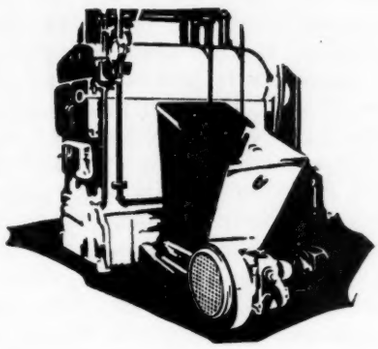
# PREPARATION

+ What do modern preparation trends mean to the coal buyer, who has the last word? An answer to this question is here presented by representatives of three of the major consuming groups which absorb over 60 per cent of the annual output.

R. A. Miller, Miller & Banker, Chicago, who speaks for the domestic consumer, represents the National Retail Coal Merchants' Association on the Committee of Ten and has been successfully engaged in the retail coal trade for many years.

G. B. Gould, president, Fuel Engineering Co., New York, is a specialist on industrial fuel problems, and his work as a fuel consultant brings him into intimate contact with the coal question as seen from the viewpoint of the industrial buyer.

Malcolm Macfarlane, who served the New York Central Lines as chief fuel inspector from 1923 to 1931, brings to his review the fruits of long study of the relationship between properly prepared coal and efficient railroad operation.



combustion, in order that the bad burning practices or wrong plant conditions of the consumer may be corrected. When that occasion arises, a consumer who has received evenly sized, clean coal, free from extraneous matter, will be much more easily educated than one who feels that he has been "slipped" some industrial coal at domestic prices.

C. E. Bockus, president, National Coal Association, in a recent address at Birmingham, said that conditions had existed "where the only profit made on coal has been on the so-called domestic sizes." Milton E. Robinson Jr., president, National Retail Coal Merchants Association, speaking at Cincinnati in 1929, pointed out that the retailer buys one-tenth the product and supplies nine-tenths the profits. Why not heed the voice of the consumer who pays the best price and insists on having what he wants? He'll pay a profit on his purchase when he is pleased, and refuse all else, as did the man who returned the gift of a suit of clothes because it did not have two pairs of pants.

Let us compliment those operators whose vision shows the way to those who lag. By thorough washing and proper sizing they have made good coal better and in some cases have changed coals which were classed as "dog-leg" to premium merchandise. There does not appear to be much in prospect for the operator who is satisfied to produce a coal which is "just as good as the average in the field."

Despite the hopes of some, there seems little chance of material reductions in coal freight rates. It would seem, therefore, that without the possibility of lower delivered costs, the present conditions call for the ultimate in quality of product. To this end "Layer Loading" will add by retaining the sizing that has been attained. We can't stop progress, and if coal is to remain dominant in the heating field its natural advantages must be emphasized and its desirability increased by every available method of preparation applicable to the size.

There is no university offering a course in prognostication, so I hold no title as Master of Prophecy, yet I will venture the belief, which others hold with me, that within ten years practically no smokeless, in a mine-run state, will be moved in the Chicago market. The demand will be for sized coal and the heating plants now burning mine-run will be using coals in stoker sizes.

Changes in other markets with which I am less familiar will be just as drastic. The sale of large lump sizes, on which the degradation of loading, shipping and rehandling is greatest, will be discouraged. And this with profit both to dealer and consumer, as in modern equipment smaller, more evenly sized coal can be burned more economically and with less attention.

Specially sized and prepared coal doubtless will remain the fuel of the future. We can make it doubly sure by marketing it in its cleanest, best and most attractive condition.

## II . . The Industrial Buyer

FROM the standpoint of the coal operator, preparation has for its direct object a higher price for his product, or a lower sales cost, or a larger share of the total volume of business, or some combination of all three of these benefits. Success in achieving these advantages depends, of course, upon giving the consumer greater value.

That these greater values are attainable has already been demonstrated by the experience of operators who have pioneered in preparation methods. The real addition to coal values resulting from good preparation will unquestionably be recognized by the industrial consumer and it is large enough to reward amply the operator who thus improves his competitive position by giving his customers more for their money.

The value of coal to the industrial consumer depends partly upon the heat value of the coal and partly upon those physical qualities which either favor or interfere with the recovery of the heat value. The first is a de-

finitely measurable quantity, and affects the value of coal for all consumers alike. The qualities which help or hinder the recovery of the energy the coal contains have widely differing values for different consumers, depending upon the characteristics of the plant in which the coal is to be used.

There are not only a considerable number of types and makes of pulverizers and stokers but plants differ in grate area and furnace volume available to burn a given quantity of coal per hour, in the relation of available draft to the required combustion rate, and in the relation there is between the physical capacity limit of the coal-burning equipment to the maximum steam demand. Even the number and size of the steam-generating units in a given plant may affect coal selection by modifying one way or the other the maximum and minimum rates of combustion.

In the plants that exist today there will be found an almost infinite variety of combinations of these factors, which ultimately determine the value which the consumer will put on different combinations of coal characteristics. There is, therefore, no typical industrial coal consumer, and consequently no fixed scale by which the value of coal preparation can be completely measured. And it must be remembered, too, that these individual consumer needs are constantly subject to change in existing plants due to changes in operation and as a result of the continuous development of new equipment having different operating characteristics, which gradually replaces the old.

The introduction of pulverized coal has brought about one very logical development in sizing, by providing a natural market for the fines, minus ½ or ⅜ in., thus automatically improving the remainder for stoker use. We have finally developed two complementary uses, which can both be met by the simple device of separating the fines from the larger coal. Looking a long way ahead, it is probable that this separation will ultimately constitute all the sizing that will be required to meet the demand for steam generation in industry.

In so far as the heat value of a coal is increased or the efficiency of a given plant improved as a result of preparing a coal, the increased value to the consumer can be determined and stated in terms of cents per ton. This measurable increase in value to the individual consumer varies to a considerable degree, however, according to the location of the plant, because of the preponderant proportion of freight charges and handling costs in the total cost to the consumer. This works in favor of the producer because an increase in value to the consumer of less than 10 per cent, figured on delivered cost, may under some circumstances be equivalent to an increase in value of as much as 50 per cent, in terms of the mine price.

The accompanying chart illustrates these relationships. The lowest section shows the increase in value per ton to the consumer directly resulting from the higher heat value which would follow from a reduction of 3 per cent in the ash. If we assume that the decrease in ash is not accompanied by any physical change in the coal which makes it *less* usable, this may be considered the basic increase in value to *all* consumers.

Now if this increase in heat value is accompanied by the exclusion of fines and by uniformity of sizing, which in addition to the reduction in ash would enable a given plant to improve its efficiency by 2 per cent, the gain in value per ton is nearly doubled, and each additional gain of 2 per cent in efficiency adds another increment of like amount to the value. While a gain of as much as 6 per cent in efficiency attributable solely to coal characteristics is not likely to be encountered, it will be seen that even a gain of 4 per cent, combined with an improvement of 3 per cent in ash, will add a substantial amount to the value of the coal per ton, particularly at those points where the total transportation costs are high.

It must be remembered, however, that the gains in efficiency attributable to improvements in coal quality will differ greatly among plants. Some plants are capable of being operated at relatively high efficiency with coal that is high in ash and not graded according to size at all. In such a plant, the increase in value due to better preparation would be but little more than the increase in the heat value of the fuel itself. While plants vary among themselves, each one has a certain inherent limit of efficiency beyond which no combination of coal characteristics will enable it to go. This fundamental fact is often overlooked when it is attempted to apply the highly favorable experience of one plant with a coal of high quality to some other plant which is superficially similar in equipment but which may differ radically from it in operating characteristics.

An improvement in efficiency must come primarily from one of two causes, as far as the character of the coal can affect it. One of these is a reduction in the percentage of coal which is removed unburned with the ashes. The absolute percentage of loss here is chiefly determined by the kind of equipment and the rate at which the coal is burned, but these two factors remaining constant, general experience confirms the general principle that this loss *tends* to be lower with lower ash coals, and with coal more uniformly sized, when the coal is burned on a solid fuel bed, as in the case of stoker-fired plants.

The other point at which the physical characteristics of a coal may affect efficiency is the possibility of maintaining a fire which offers a more uniform resistance to air and makes it easier to maintain a uniformly satisfactory percentage of $CO_2$. There are so many other factors which can and do influence boiler efficiency, that it is easy to make the mistake of attributing quite fantastic and almost mystical qualities to coal, in the absence of sufficient critical data. But the fact is, there are just two ways in which the quality of coal can contribute to higher boiler efficiency:—to permit either a higher $CO_2$ percentage (and/or in rare cases, a lower CO percentage), or a lower loss of unburned coal in the refuse.

But efficiency is not the whole story. Efficiency, in this connection, simply means the proportion of the heat value of a given coal which the plant recovers in the form of steam. The original cost per million B.t.u. and the efficiency of the plant, taken together, represent the major controlling factors on the cost of steam in most plants. There are other considerations, of no importance in some plants, but of paramount importance —almost regardless of the cost of coal, or of efficiency—in some others.

An industrial steam plant underlies the operation of a more or less intricate and often far-flung industrial machine, the payroll and the value of the products of which are frequently many times the whole cost of operating the steam plant. The steam plant does not perform its function unless it is capable of supplying continuously as much steam as the whole plant needs, and at the proper pressure. Failure to do so may incur losses outside the boiler plant of such magnitude as to dwarf ordinary differences in coal values, or boiler plant efficiency.

Such a situation, although theoretically always present, becomes a matter

of serious consideration in coal selection only when the steam plant is operated close to its limit of capacity. In such a case, the steam plant really is inadequate, but circumstances may make it expedient to operate that way for a period of time. Here the coal with the higher heat value, and possibly better sized, may have the effect of providing what amounts to additional capacity, and so increases to that extent the margin of safety. This represents an emergency value under special circumstances, the value of which cannot be appraised by any mathematical formula.

Frequently related to a situation like the one just depicted is the matter of clinker formation. Serious clinker formation places a severe restriction on a plant's capacity, increases maintenance and labor costs, and depresses efficiency under any circumstances. In a given plant, and under given operating conditions, this is related chiefly to the fusing point of the ash, partly to sizing. The efficiency of a plant or the heat value of the coal are matters of degree, and values can be put upon their variations over a considerable range. But serious clinker formation is one of those conditions which, practically speaking, either exist or do not. If it does exist, it is intolerable.

From the standpoint of the plant operator, it is not a matter of saying that it is worth 25c. a ton, or any other amount, to correct it. He has to accept the definite limitation in coal selection as a fact, and adapt himself to it, either by modifying his operation or by selecting another coal which will not produce clinkers which seriously interfere with the plant's performance. It becomes necessary to exclude from consideration those coals which will cause such a condition, no matter at what price they are offered, and then make his choice from the remaining coals which will not have this handicap, depending upon their relative values and prices.

It is, therefore, impossible to put a value in terms of cents per ton on a process of preparation at the mines which will increase the fusing point of a coal 100 or 200 deg. That depends on whether the fusing point is to be raised from an original point of 2,700 deg. or from 2,300 deg. And it also depends upon the relative supply and demand for coals within a given range of fusing point. A higher fusing point is not like a higher heat value, for the higher heat value can be recovered, but a fusing point of 2,700 deg. is of no additional value to the plant which can operate successfully with a 2,300 deg. fusing point coal. The fact that a high fusing point requirement limits a plant's field of choice means, of course, that a mine correspondingly increases its potential market if it either raises the fusing point of its coal by preparation or by sizing makes possible higher combustion rates without clinker formation.

Uniform sizing, including the elimination of fines, has been found beneficial to some extent in avoiding clinker formation, and therefore has somewhat the same practical effect as an increase in fusing point. It is not possible in all mines to raise the fusing point materially by preparation. Many coals have a residual ash content which is inherently low in fusing point, but there are some which have a naturally high fusing-point ash that is reduced by the presence of iron pyrites. Preparation which will exclude the pyrite in such cases will produce a marked change for the better in the fusing point.

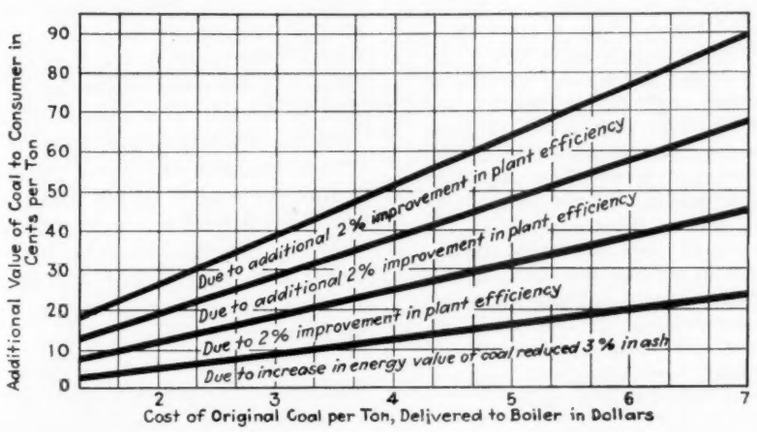
We have performed an interesting series of experiments in our laboratory by reversing the process. A group of coals representing a considerable range of seams and coal fields was selected, and the natural fusing point was determined for each one. Then progressively small quantities of pyrite were added equally to each one, and the fusing point was redetermined. While the fusing point tended to decline in all samples as the pyrite was increased, there was for each coal some particular point at which the fusing point took a sudden drop of anywhere from 200 to 400 deg. with a very slight addition of pyrite. Some coals have a natural pyrite content that seems to hover around this critical point, so that minor variations produce quite pronounced variations in the fusing point of the coal as shipped. Uniformity of fusing point is important to the consumer, for an occasional shipment which is below the normal fusing point that he is accustomed to, may cause severe losses.

A reduction in the cost of handling ashes, though not a large gain, is one which can be directly credited to improvement in quality from preparation. This is one of those costs which will vary considerably among plants, but a very rough approximation of this value would be 1c. per ton of coal for each 1 per cent reduction in the percentage of ash.

Another advantage which comes from uniform sizing and the separation of the fines from the larger coal is found in the fact that coal so prepared is less likely to take fire spontaneously in the pile. Conditions favorable to spontaneous combustion often seem to be created by the separation of the fines and lumps as the coal is dumped on a pile, causing a blanket of fines at the top and a layer of lumpy coal at the bottom.

The effect of coal quality on operating costs in which boiler-room labor and maintenance constitute the chief controllable items is another matter difficult of exact appraisal. It is so difficult to separate accurately that part of maintenance costs which is the natural result of deterioration from normal use and that part which may be excessive due to certain coal characteristics that in the majority of industrial plants it would be impossible to place a value on coal preparation from that standpoint, except in those cases in which the original unprepared coal obviously was unsuitable for satisfactory operation anyway.

Except in the very large plant, an improvement in coal quality, within the practicable range, is not likely to be reflected in labor costs, for the reason that there is usually so much give and take in the boiler-room labor



normally required that the improvement in coal quality would not release a man. It may, however, be beneficial in creating better labor conditions, which has some, though indeterminate, value.

The ultimate success of more general coal preparation will depend upon the ability of the operator to conduct the preparation process at a cost which will enable him to share with his customers the added value. In the long run, this will have to be within the value of those measurable factors: the heat value of the coal and the higher plant efficiency which can be definitely attributed to the improved quality of the coal. For a time, perhaps for many years to come, he is likely to find that many consumers will gladly pay a quite disproportionate premium for better quality, based more on the intangible than on the measurable values. Particularly in the smaller plants those factors which are incapable of measurement are likely to have assigned to them exaggerated values. But that is a matter of human nature rather than engineering.

From the operator's standpoint, coal preparation has very definite advantages in addition to the better values which he can give his customer, and presumably be paid for at a profit. Under conditions such as the coal industry faces, in which the whole demand can be supplied by substantially less than the number of mines operating, the operator who can supply a superior product without charging a premium that is out of line with the real added value should attract a steadily growing share of the total business. This leads naturally to better profits, as well as a better chance of survival, to both of which he will be entitled for a real contribution to national economy in steam generation.

## III . . The Railroads

THE high standard of present-day railway operation has been attained through strict attention to innumerable details. Not the least of these is the character of fuel burned in transportation service. One ton of poorly prepared coal can cause costly delays, retard regular service, and interrupt important schedules—in addition to increasing fuel consumption. Coal, therefore, takes first rank in the factors contributing to operating efficiency, and consequently a careful study of the proper preparation of the large tonnage of coal consumed as railway fuel is year by year becoming increasingly important. Without unremitting attention to the character of the coal and the methods of burning it in locomotives, heavy losses would occur, and railway service would be seriously impaired.

Several railroads maintain an exacting twenty-hour schedule between New York and Chicago. In this service, one locomotive is operated over several divisions, and is capable of completing the entire run of approximately 1,000 miles on schedule time. These schedules are successfully adhered to over long periods of time, but the performance would be impossible with a poorly prepared coal which, because of extraneous matter or high ash content, would impair the performance of the locomotive and possibly cause steam failures.

Suburban service is an important item in railroad operation in thickly settled areas, and is accomplished by the employment of electric motor-drawn trains running on exacting schedules. A possible power failure would mean that the whole complex system would be thrown into complete confusion. Consequently, the generating station must maintain service at all times, which means in turn a coal well prepared in accordance with the best requirements of central station practice.

**Approximately 260,000 miles of track form the backbone of the railway transportation systems of the United States and Canada. More than 55,000 coal-burning locomotives are employed in rendering efficient service to hundreds of millions of passengers and in delivering promptly the tremendous annual tonnage of freight, and today more than 12,000 of these locomotives, in both freight and passenger service, are equipped with stokers. Bituminous coal production in the United States has averaged close to 500,000,000 net tons in the past five years; of this total, Class 1 railroads consumed approximately 25 per cent, the coal bill constituting the second largest item in railroad operating cost, second only to labor.**

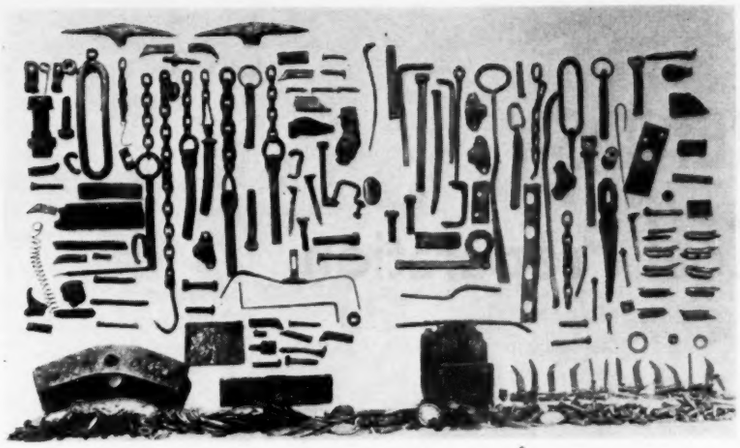
Fast freight schedules also are an important factor in railway operation and, in order that these trains may arrive at their destinations on time, command the respect of every employee. Proper steam pressure must be maintained throughout the run and locomotives must operate at practically 100 per cent efficiency. To meet these demands, proper selection and assignment of a fuel supply that is clean and uniform in quality is of paramount importance.

Variance in the character of coals which are immediately available to the lines of the respective railroads and in the type of service they render make it impossible to prescribe any specific size of coal which will meet the general requirements of every carrier. This problem must be solved by the individual lines in accordance with their particular operating conditions. Purchase of fuel from mines on the lines of the carriers is a general practice and, as an example of the ability of the railroads to adapt these coals to their particular operating problems, the use of more than a million tons of lignite by one northern transcontinental line may be cited. In the last analysis, however, the important consideration in the proper maintenance of passenger and freight schedules is a well-prepared and uniform coal.

With the increasing use of stokers on locomotives, the removal of foreign material which will prevent a stoker from operating is becoming more and more of a problem. Pieces of wood of various shapes and sizes, pieces of iron, sulphur balls, track spikes, machine bits, mine-car links and pins, and other examples of mining and railroad equipment find their way into the coal car either during loading or shipment, thus making both the operator and the railroad responsible for the presence of foreign material.

Much can be done to eliminate this material by close supervision all the way from the working face in the mine to the point where the coal ultimately is delivered to the locomotive. More than fifty coal operators on the New York Central lines have installed electro-magnets to remove tramp iron before the coal is loaded into the car, and the railroad has in turn done its share by installing magnets in several of its principal coaling stations. As a result, stoker obstructions are rarely encountered.

In the selection of a locomotive fuel, both the physical and chemical constituents are important consider-



**Types of Foreign Material Removed From Coal**

ations. Although the chemical analysis is not used in purchasing railroad fuel, it is frequently referred to in assigning the coal to the service in which it will give best results. Regular assignment of the same grade of coal to specific locations and the avoidance of shifts from one variety to another have an important bearing on efficient railway operation.

While the character of ash in coals varies greatly, control of the quantity present will eliminate, in many cases, the greater part of the losses inherent in operation with a poor quality of coal, and where sulphur and its attendant constituents occur in quantities sufficient to make the ash fuse more readily, a general attempt at regulating ash content will keep many troubles from this source at a minimum.

Where the ash in coal does not clinker, it does not seriously obstruct the passage of air through the fuel bed and can easily be shaken through the grate. Thus, while the ash does not produce heat, it gives very little trouble. A coal with an excessively high ash content, however, cannot be used successfully on extended runs. High-ash coals build up the fire too rapidly, but coals with extremely low ash contents usually result in an unsteady fire and an increase in consumption. Ash which melts into clinkers and runs on the grate bars obstructs the air passages and results in a lowering of the steam pressure. These coals must be guarded against as uneconomical.

Removal of as much ash as possible has a considerable influence on the heat content of the coal as fired and on the distance over which a locomotive can operate without dumping the ash. As an example of what may be done in reducing ash content, the results of a test made by the Atchison, Topeka & Santa Fe Ry. in 1923, reported in the proceedings of the International Railway Fuel Association, may be examined. The tests were made with a passenger service using mine-run coal before and after air-cleaning, and were carried out over the New Mexico division, which is 348 miles long and required the following running time: westbound, 11 hours, 45 minutes; eastbound, 11 hours, 30 minutes. A car of coal was cleaned at a mine plant, with the results shown in Table I. By hand-picking and air-cleaning the coal, 7.1 per cent of slate, dust, moisture, and some included coal, was removed. The proximate analysis and heat content of the cleaned coal are shown in Table II, which also gives the same information for face samples and the mine-run product before cleaning.

The cleaned coal, as shown in Table II, had a heat content 7.7 per cent higher, on the dry basis, than the uncleaned mine-run. Tests in the locomotive showed an increase of 7.2 per cent in the equivalent evaporation through the use of cleaned coal, and the locomotive was able to operate over longer distances without dumping the pan ash. Also, the decreased ash to be hauled away from the pits was a further advantage.

When mine-run coal is used in locomotive firing, the slack content should not be excessive, as an undue quantity of this material in the coal retards combustion in the firebox. Some Eastern railroads have standardized on coals with a maximum slack content of 35 per cent, as a higher percentage is considered unsatisfactory for best locomotive operation. With an excessive slack content, a high stack loss and dirty flues result when the engine is working hard. Consequently, use of this type of coal is not economical. Actual locomotive tests made at the University of Illinois Testing Laboratory revealed the following cinder losses, expressed as percentages of the weight of dry coal fired, when the combustion rates were high:

| | Per Cent |
|---|---|
| 2x3-in. nut | 6.3 |
| 3x6-in. egg | 7.9 |
| 2-in. lump | 8.4 |
| Mine-run | 9.8 |
| 2-in. screenings | 15.5 |
| 1½-in. screenings | 17.8 |

With stoker-equipped locomotives, proper sizing becomes of increasing importance. In its essentials, the stoker consists of a screw conveyor operating in a metal trough to carry the coal from the tender to the firebox. After the coal reaches the firebox, it is distributed by means of steam jets, which scatter it over the entire area of the fuel bed. More uniform sizing permits a greater evenness in the distribution of the fuel in the firebox, reduces the load on the stoker, and thus permits feeding coal to the firebox at a more uniform rate.

In conclusion, the author wishes to acknowledge his indebtedness to officers in charge of fuel performance for the Central R.R. of New Jersey and the Reading R.R. for assistance in the preparation of this article.

**Table I—Results of Cleaning Railway Fuel**

| | Pounds | Per Cent |
|---|---|---|
| Coal dumped from mine car into hopper | 108,000 | 100.00 |
| Coal over 1½-in. screen | 32,400 | 30.00 |
| Coal through 1½-in. screen | 76,600 | 70.00 |
| Slate and refuse picked out by hand | 1,300 | 1.20 |
| Slate and refuse removed by cleaner | 5,040 | 4.70 |
| Loss as dust, moisture, etc. | 1,260 | 1.20 |
| Cleaned coal, over 1½-in. | 31,100 | 28.80 |
| Cleaned coal, under 1½-in. | 69,300 | 64.10 |

**Table II—Comparative Analyses of Face Samples, Raw Mine-Run and Cleaned Coal**

| Face Sample | Moisture | Vol. Matter | Fixed Carbon | Ash | Sulphur | B.t.u. |
|---|---|---|---|---|---|---|
| Moist basis | 1.7 | 38.0 | 48.6 | 11.7 | 0.46 | 12,500 |
| Dry basis | ... | 38.7 | 49.4 | 11.9 | 0.47 | 12,730 |
| Combustible | ... | 43.9 | 56.1 | .... | .... | 14,400 |
| Raw mine-run | | | | | | |
| Moist basis | 2.7 | 35.3 | 42.7 | 20.3 | 0.47 | 11,020 |
| Dry basis | ... | 36.3 | 43.8 | 20.9 | 0.48 | 11,330 |
| Combustible | ... | 45.3 | 54.8 | .... | .... | 14,140 |
| Cleaned mine-run | | | | | | |
| Moist basis | 2.7 | 36.1 | 45.5 | 16.7 | 0.46 | 11,870 |
| Dry basis | ... | 37.1 | 46.7 | 17.2 | 0.47 | 12,200 |
| Combustible | ... | 44.3 | 55.7 | .... | .... | 14,500 |

# TECHNICAL TRENDS + In Bituminous Coal Preparation During 1931

IN the field of coal preparation, especially the more refined processes, 1931 was a year of courageous optimism for the future and trust in new equipment and methods to narrow losses or increase profits. This optimism was evidenced by the considerable gain in hourly capacity of topworks, a gain which though appreciably lower than, compares favorably with, that of 1930, considering the drastic cut in total tonnage produced. As competition for the bulk of this restricted tonnage could be met only on the basis of quality which the modern plant as a rule alone could provide, and as the production of individual companies with several mines was concentrated in their best, it is likely that the rate of tonnage increase for modern preparation methods exceeded that of the year before.

This review is limited to statements of new developments and interpretations of trends, together with opinions of the field, regarding the technical problems of bituminous preparation. For a complete picture of new topworks construction, turn to p. 72, and for information on anthracite preparation see p. 53.

Reference has already been made to the quality of coal produced in 1931. In no other year was the standard so high. Competition saw to that. This competition, incidentally, extended to the methods by which the quality was raised. Advocates of wet and dry processes, or of some favorite method under either, are fighting between and among themselves. It is the advent of this last competition in actuality, with a corresponding cessation of mouth praise, that is lending impetus to methods individually and collectively.

Mechanical preparation is slowly but surely spreading westward. Two years ago, in the *Coal Age* review of preparation, the statement was made that the Middle West, particularly Illinois, was strengthening its sizing practices, while the East placed increasing importance on mechanical cleaning. The review for 1930 indicated a doubt among some of the Illinois operators of the wisdom of sole reliance on this measure. In 1931, a few of the operators in this state openly expressed belief in the coming of mechanical cleaning to their mines. A plant finally went in, though far north of the large producing counties. Illinois has faltered into step. Last year saw also the erection of new plants within competitive range of the important Illinois fields. A new plant was installed in western Kentucky; several were added in Indiana. Further east, Ohio is well in line. Kansas and Missouri each has its plant.

Pennsylvania and West Virginia were neck and neck last year. A notable step was taken by W. J. Rainey, Inc., which erected two pneumatic plants, the significance being in their location in the Connellsville region of Pennsylvania. Certain Tennessee mines appeared to be investigating mechanical cleaning of slack.

Prior to 1931 there was only Chance sand-flotation installation outside the anthracite region. At the end of the year two plants employing this process were in operation—one at the Coverdale (Pa.) mine of the Pittsburgh Terminal Coal Corporation, where the throughput attained about 500,000 tons, and the second at Powhatan Point, Ohio, at the mine of the Powhatan Mining Co., which is under the management of the first-named company. The Powhatan plant, which has been operating double shift since Sept. 21, has a washing capacity of 425 t.p.h. Its task is unusual in that the upper size limit of washing is 6 in., the lower being $\frac{1}{4}$ in. Before the year expired the Terminal company contracted for the erection of a preparation plant at Avella, Pa., with an over-all capacity of 500 t.p.h. and incorporating a Chance washery with an hourly capacity of 425 tons. Here, too, the upper size limit will be 6 in., and the plant probably will be operated double shift.

Installation rights for the Norton automatic coal washer, which has extensive application abroad, were acquired by the McNally-Pittsburg Manufacturing Corporation. This unit is a development from the Baum type of jig. Two features of the unit are an automatic refuse gate for maintenance of a minimum depth of refuse bed, and an automatic stop-

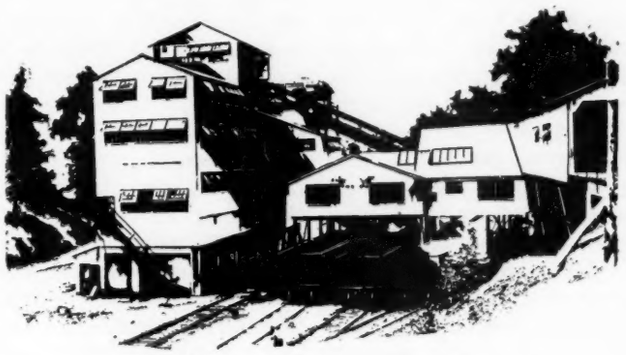
## *The Field's Review*

**Much of the information and many of the opinions contained in this article and those which follow were contributed by operating men in the field, by manufacturers, and by those in allied interests. It is important that this fact be brought out, for it sheds a light on the more penetrating value of the review than if the editors assumed the task alone. Space limitations do not permit the naming of every contributor; in many cases the contributors desired to remain anonymous. To all, the editors here express their sincerest appreciation.**

start control. The first unit, this of British manufacture, was installed at the Montevallo mine of the Montevallo Coal Mining Co., at Aldrich, Ala. (see *Coal Age,* Vol. 37, p. 5). A second installation of this process, at a mine of the Linton-Summit Coal Co., Indiana, is now being made.

One of the additions of the year to preparation equipment is the new Cumberland mechanical cleaner, which uses no separating medium to classify feed or to remove the refuse from the coal. It consists of a shaking plate with a series of rectangular slots which are opened and closed by pivotal gates as the shaker oscillates. By this mechanism flat pieces of refuse are trapped out. The performance of this cleaner at two Virginia mines will be described in an early issue of *Coal Age.*

A central cleaning plant comparatively remote from the mines it serves



was put into operation by the West Kentucky Coal Co., at Paducah, Ky. In this plant, purchased coal also is cleaned. The innovation in this installation is the application of the mass principle of treatment on American air tables, which eliminates prescreening. The 2x0-in. coal is first treated *en masse* on one separator. It is then passed over $\frac{3}{4}$-in. screen openings and the undersize re-treated on a second table. This size, in turn, is divided at $\frac{1}{4}$ in. and the undersize treated on a third table. In general practice the number of re-treatment passes required, if any, depends on the amount of the impurities and the quantity of the smaller sizes.

The first complete mechanical cleaning plant to be installed in Illinois in recent years was erected in the northern part of the state at the Atkinson stripping of the Midland Electric Co. This plant, having a capacity of 315 t.p.h., uses Montgomery jigs. Dewatering is accomplished on a vibrating wedgewire screen. A Bradford breaker is used to remove pyrite, which is shipped for manufacture of sulphuric acid, a practice borrowed from a plant in Kansas. Short haul to the point of use makes this profitable.

At Mogg, Ky., a three-stage unit of the air-sand process, capacity 100 t.p.h., was put in for the Green River Fuel Co. The earlier installation of the process, made at Cadoggan, Pa., had only two stages of cleaning initially, but this unit also now has three stages. A feature of the Kentucky plant is the aspiration of dust from the feed, a step, incidentally, which is planned for one of the big producers in Illinois. This removal of fine dust has a threefold object: It makes for dustless handling; it is beneficial in ash reduction with coals having an inordinately high percentage of impurity in the finest sizes; it materially decreases the dust discharged into the atmosphere with flue gases.

During the year an important change was made in the construction design, but not in the principle, of the Rheo launder, which establishes the status of this equipment as a unit system. The new self-contained sealed discharge unit, developed to handle 250 to 300 t.p.h. of minus 4-in. coal in a flow as compact as a jig, opens up a new field for the application of the system in existing tipples. Two units have been installed in West Virginia, one at the Glen White plant of the C.C.B. Smokeless Coal Co. and the other at the Keystone mine of the Koppers Coal Co. In this latter case no material change was made in the outward appearance of the tipple.

In southern Indiana, the Big Vein Coal Co. erected a plant which combines hydroseparators with Deister-Overstrom tables for washing $2\frac{1}{2}$-in. slack. In the flow the tables are used for cleaning the minus $\frac{1}{4}$-in. coal, which is dried in Carpenter centrifugal dryers. All sludge down to minus 50-mesh is recovered from an outside pond.

With the installation of MacIntosh and Denver froth flotation machines, combined capacity 20 t.p.h., at the Champion No. 5 plant of the Pittsburgh Coal Co., individual separation treatment of the smallest bituminous sizes is placed on a commercial basis.

A wet process developed by C. Erb Wuensch, of Joplin, Mo., was applied to the cleaning of coal during the past year. It is based on a differential density separation within a classifying cone, and relies on impurities in the coal feed itself to provide the necessary gravity medium. This process was recently acquired by the Roberts & Schaefer Co.

Dependence for an upward current of water in a closed circuit is placed on a difference in hydrostatic head between the fluid level in the cone and a higher fluid level in a scraper-wheel shoe which removes the reject from the bottom of the cone. It is through this shoe, therefore, that the recirculation is effected. Revolving paddles on a vertical shaft assist the separation.

One of the features of the process is a valve of rubber, pneumatically operated, and located at the bottom of the cone, through which the reject is trapped out. The air which operates this valve is balanced against the hydrostatic pressure in the cone. Operation of this valve consequently is automatic, the pressure behind the valve responding to that in the cone. Thus the valve opening is enlarged or reduced to maintain the correct gravity in the separating or middlings medium.

First application of this new process was made in a pilot plant of 35 tons-per-hour capacity for cleaning minus $1\frac{1}{4}$-in. x 40-mesh slack at the No. 10 stripping operation of the Pittsburg, & Midway Coal Mining Co., Pittsburg, Kan. This plant was put into operation in July and has been running on 24-hour shifts. It offers two points of significance. One is that on the strength of pilot-plant performance, the coal company is in the process of designing a commercial plant with a capacity of 200 t.p.h. The second is that the cleaning job is unusual, having to deal with a feed containing varying percentages of fireclay, gypsum, shale and pyritic impurities, this variation being such as is likely to be encountered at any stripping operation.

Two new pneumatic systems are under development. One of these is

employing principles radically different from those on which present processes are based. For obvious reasons, details of operation are withheld.

Continuous vacuum filters became permanent installations in at least three large cleaning plants in Pennsylvania. Two 100-sq.ft. American filters were in operation at the Nemacolin plant of the Buckeye Coal Co.; two 700-sq.ft. Genter filters operated in the Clairton washer of the Carnegie Steel Co.; and the Pittsburgh Coal Co. used a 350-sq.ft. Oliver filter, two 500-sq.ft. and one 200-sq.ft. Dorr filters. These units have solved the problem of sludge except for moisture content. Their entrance into the field of cleaning goes a long way toward solution of the problem of stream pollution by washeries.

At the two large washeries in the Pittsburgh district operated to supply coal to steel companies it has been demonstrated that a closed system can be maintained with little loss of water, and that at the same time a coal can be produced of a moisture content which causes only slight, if any, reduction in the throughput of the coke ovens. This is accomplished without the expense attendant on heat drying, by utilizing screens for drainage of plus $\frac{3}{8}$-in. coal; mechanical drying of $\frac{3}{8}$ in. x $\frac{1}{4}$ m.m. in Carpenter dryers; and thickeners and filters to recover and dry the minus $\frac{1}{4}$ m.m. The finished coal, ranging in size from 4 in. to 0, averages about 5.5 per cent, or about 2 per cent higher than the moisture content before treatment.

As already explained, no water or sludge need be wasted to aggravate stream pollution, and the make-up is only 6.5 gal. per ton, or 65 to 75 g.p.m. for a capacity of 600 to 700 t.p.h. One of the two plants just mentioned has treated 1,000,000 tons of coal in less than four months of operation.

Vibrating screens continued to grow in importance in the modern scheme of preparation everywhere. Many installations were made for handling the smaller sizes in main plants and re-screeners. During the year the utility of this equipment was extended to primary separation of sizes, from the largest to the smallest. One of several such installations was made at the Syracuse mine of Syracuse Mining, Inc., in the Pomeroy field of Ohio (*Coal Age*, Vol. 36, p. 485). The desire in the first instance for quick erection of a tipple to replace one destroyed led to results which gave complete satisfaction in the preparation of 4-in. lump and two other prepared sizes. Another novel method is the use of Bradford breakers for the removal of impurities from mining-machine cuttings. Today, few plants are considered strictly modern unless provided with mixing and crushing equipment.

Singleness of opinion reduced from replies from the field show that operators are selecting their equipment requirements more guardedly. There is a strong belief, that the size limitations of the various systems individually have not been accurately determined for all of the many different sets of conditions. Not until these points are decided for each specific case, it is said, will efficient cleaning in all sizes become general, and not until then will there be realized in every case a comparatively low capital expenditure with reasonable operating and maintenance cost.

Those who formulated these opinions cannot see how they could go back to older methods without losing much of their present tonnage. A few reported a direct increase in profit per ton. The majority realized only an indirect profit, stating that with the times as they were, their normal profit would have diminished or their losses increased without the marketing value of modern preparation.

A characteristic of the average operator in his dealings with the provider of equipment was the accentuation of demand for low investment cost. Never before did the new dollar buy so much value in preparation equipment, and many of the operators who installed new plants did so largely with this realization in view.

That the coal industry is gradually getting into the economic spirit of equipment obsolescence is in no phase of operation more marked than in preparation. What to some operators might appear ultra-modern in preparation facilities are, to those who discard them, out of date. More than one sound and serviceable plant in this category was abandoned on this last premise. In this connection, new plants are being erected with provisions for future changes and additions. As one engineer in charge of preparation plants puts it, the demands of new customers and new markets make these adaptability measures necessary for success. The net result is that stereotyped designs are no longer even provincial.

Paradoxically, simplicity of flow continues to be the desire of those going to advanced preparation methods. In the case of mechanical cleaning the ideal system hoped for would be one by which coal would be thoroughly cleaned in a single pass through one piece of equipment. But that has been proved to be merely a desideratum. Operators are learning that re-treatment is a necessary step to refinements in cleaning.

Where mechanical loading is the practice, a mechanical cleaner can afford to, and does, reject a higher percentage of feed as refuse. The direct operating cost of cleaning per ton of input, therefore, is lower and the quality is higher than would be the case if higher recovery were the aim. The completely mechanized mine can better afford this, because the coal is cheaper in underground cost.

In this connection it should be pointed out that separation efficiency is subject to the law of diminishing return. It is one thing to seek high efficiency, and another to expect the last margins of efficiency increase to pay as well as a previous zone of increase. From the standpoint of design, to paraphrase the "taking of the last squeal from a butchered hog" in the packing industry, the objective should be to get the lost B.t.u. in standard quality coal from the plant input. But from the standpoint of operation the prime purpose should be to get the last cent from the process, or the difference between total cost and realization. As realization and cost are subject to change, so also should be the reject from the preparation plant.

Combination plants became more firmly intrenched in 1931. These plants heretofore have been thought of largely in terms of dual operation of wet and dry processes under one roof. During the year two wet processes were thus teamed up.

Selective mining and face preparation, two phases of underground operation which with the introduction of mechanical cleaning were left behind with hand preparation, are regaining and even exceeding their former lofty position. No operator can expect to ship a satisfactory product if production of the raw coal sent to the cleaning plant is not controlled, especially where the mine is mechanized.

In mines where hand loading is the practice the workings extend over large areas, and experience has shown that even the best mines have areas of below average coal. In conse-

(*Turn to page 56*)

# SLACK MARKET SPURS + Anthracite Mines to Effect Reduction of Operating Costs

**Stripping Excavator Removing Surface Rock From Anthracite**

AS THE winter of 1930-31 was mild and calm, and that of 1931-32 has been even milder and calmer, the two periods averaging in New York 4.17 deg. more than the average for 46 years, and because rival fuels have made heavy inroads, the anthracite industry has continued to set its affairs in order. Perhaps the most marked evidence of that has been in the matter of closing down the less economical plants in order to run the more economical with greater regularity. Not only is it uneconomical to run high-cost plants but it becomes still more so when thereby the running time of all the plants is made intermittent. Faces and gangways can be protected more adequately when a long shutdown is expected than where the shutdown is for an indeterminate and short length of time. Every morning after a short shutdown there is a heavy clean-up cost. This is particularly true wherever, because the roof pressures are great, the bottom heaves and the roof and pillars break.

For these and other reasons, many mines were closed down during the past year. Royalties and the types of coal acceptable to the market, whether free-burning or slow-burning, had an influence on the decisions made, doubtless, but more significant always were the costs of production, which vary greatly from mine to mine, some mines having much crush, many rock tunnels and chutes, and having to recover their coal from the pillars of caved chambers.

Mechanization has still some distance to travel in the anthracite region. For instance, only about 5 per cent of the coal produced by the Lehigh Valley Coal Co. is mechanically loaded. Yet this company has been quite active in that phase of mining operation. All the large companies have a big proportion of coal so favorably situated that, when shot, it will run down from the face to the gangway without mechanical or human aid.

At the Chauncey mine of the George F. Lee Coal Co., which loads 75 per cent of its coal mechanically and was one of the first to use shaking chutes, there are now 37 conveyors being used, 34 of which are of a local design which has been developed out of experience at this colliery. This conveyor, in general, has only a 5-hp. motor. Some, however, have a motor of 10 hp. The motor runs at 870 r.p.m. and drives a worm gear, with a reduction of 9:1. The sprocket drives an eccentric having a throw of $4\frac{1}{4}$ in.

This eccentric action is opposed before and behind by a large helical spring of 6-in. diameter. The front spring is made of 1-in. steel and the rear of $1\frac{1}{8}$-in. The connecting rod is fastened to the underside of the pans, which are 12 in. wide, 3 in. deep, 8 ft. long, and of a straight channel shape. Small channels form the sides of the trough, and when moving rock the lumps can rest with one edge in the trough and the other edge on the side channel. The pans are extremely light, each pan weighing about 100 lb. It is accordingly easy to move them up steeply pitching places where heavy equipment is quite difficult to place. A light trough in this case suffices because of the springs before and behind the eccentric.

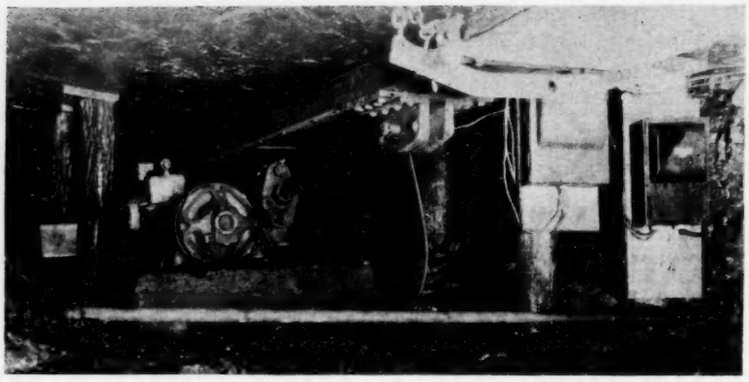
By inserting small wood blocks where the side channels of successive pans meet, the chutes can be so thrown out of line that the coal may be made to traverse an angle of over 90 deg. without the use of swivel chutes. Coal with this equipment, declares the manager of Chauncey Colliery, Fuller Reynolds, can be raised up a 6-per cent grade. Chutes may have an aggregate length of 340 ft., but 270 ft. is the preferable length. The sprocket shaft can be extended, and a capstan can be placed on it to draw material up to the face or back toward the machine. This material will rest on the angle irons at the side of the pans. The head section weighs about 750 lb. and can be installed by two men in half a day. Headroom needed is $22\frac{1}{2}$ in.

To overcome ineffectual operation of conveyors, due to low voltage on the line when locomotives are drawing too heavily, the engineers of the Westinghouse Electric & Manufacturing Co. in the anthracite region have designed a direct-current motor with a field having an excess of iron. By this means an unsaturated field is obtained. As a result, the speed is kept from increasing, as normally it would, in proportion to the cube of the voltage. Such unsaturated motors have been applied also to auxiliary ventilation equipment where the slowing down of the fan may cause gas to accumulate or delay the expulsion of powder fumes.

Better methods of loading from chutes in heavily pitching places have been introduced by the Philadelphia & Reading Coal & Iron Co. The chutes are now closed with gates rather than with plank, and consequently the loading is better controlled than before, but the biggest

improvement has been in the introduction of small hoists for spotting cars under the chutes instead of using mules and men for that purpose. A Little Tugger hoist is provided for each battery of six chutes and is located in the center of the battery. Any car can be moved by remote control of the hoist.

Each car will need moving about three times when being filled, and the man who is filling the car, with the aid of the hoist, can move it at his convenience. Should the chute block, that delay will not affect in any way the operation of the other chutes. In this manner, the labor and animal cost of loading coal from chutes has been greatly reduced.



**Conveyor With Drive at Chauncey Colliery; Electrical Equipment Serves the Drive Shown and Drives of Three Subsidiary Conveyors Emptying Into It**

Anthracite strippings are adopting a wide range of machinery. At the Clinton stripping of the Hudson Coal Co., at Forest City, a Monighan excavator, operated by Carey, Baxter and Kennedy, has moved 100,000 cu.yd. a month of overburden, with two shifts each of two men. This excavator has a walking device. It rests on a circular bearing base 30 ft. 8 in. in diameter and has two pontoons, or "feet," each covering an area of 210 sq.ft. It has a 160-ft. boom and a 6-cu.yd. bucket. It is operated by a 300-hp. Diesel engine. The overburden averages 25 ft. in thickness, and the coal to be uncovered is 4 ft. 2 in. thick, a ratio of 6:1.

At a stripping of the Dick Construction Co., a 75-ft. aluminum-alloy boom with a 1½-yd. bucket is being used. The boom weighs only two-thirds that of a steel boom of equal strength. By this boom, provided by the Bucyrus Erie Co., a longer reach with a given weight of shovel is possible than with a boom of greater weight. Though bigger, aluminum-alloy booms have been used for other purposes, some 175-ft. long; this boom marks an innovation in the stripping of anthracite. The illustration on p. 53 shows the excavator working at the Hampshire Shaft of the Lehigh Valley Coal Co., where the lift was sometimes between 70 and 80 ft. It is now being operated at the Audenried Colliery of the same company. This excavator also is Diesel-oil operated.

Believing that the ordinary wood or steel set does not show sufficient readiness to yield to the movements of the strata it supports and so suffers unnecessary stresses, which may destroy it, investigations are being made with the assistance of the U. S. Bureau of Mines into the strength and advantages of a reinforced-concrete set with articulated joints much like those of the knee. Such sets should be able to give way a little laterally and still retain all their strength in a vertical direction. Each set can be connected with the adjoining set, if it is not more than 8 ft. away.

To meet the needs of one of the coal companies, changes have been made in the winding of motors used for the driving of main fans so that these fans can be operated efficiently at reduced speed. This has reduced the power bills at mines when irregularly operated or temporarily closed down.

One large company had at one of its plants two compressors, one of 3,000-cu.ft. per minute capacity and one of 2,100-cu.ft. They were running at full tilt. In order to reduce costs, the company made an investigation of the conditions under which compressed air was being used and found that all tugger hoists and pumps, when not running, were shut off the line with single globe valves which frequently stuck tight and, in such event, were jarred loose or turned with a hammer when the compressed-air power was required. In other cases, they were turned by a heavy bar and with a violence for which the valve was not designed.

Consequently, the stems were bent and, before long, none of them closed properly. To remedy the situation, the globe valves were replaced by lubricated plug valves turned at the plug head by a lever key or socket. This is a type of valve that does not get out of order. As a result, a single compressor is doing the work that two did before, and it is running at 100 r.p.m. instead of at 145 r.p.m., the previous speed. Tugger hoists are still shut off by the valves provided, but, in addition, a lubricated plug valve is provided in the pipe, and this also is closed when the hoist is not working. As a result much air is saved.

Tests have been made in the shops of the company of the quantity of air required by different types of equipment. A standard is being issued of the type of valve to be used. Moreover, a rule has been made that whenever the mine is idle from lack of orders or for Sunday observance, the compressor shall be started, and a note taken as to the time in which the machine brings the line up to the required pressure and, when the machine is put out of service, as to the length of time before the pressure is brought down by leakage to a certain subnormal pressure. If the latter time is less than 1½ hours, investigation is made for leakage.

In airways, the roof rock often falls on the pipe, and the escape of air due to pipe breakage may remain unnoticed for some time unless some method of noting the failure of air is adopted. The operating forces are cooperating with the mechanical engineering staff to keep all losses of compressed air to a minimum.

Some small air-driven underground hoists for slope service are still maintained because of the ease and economy with which they can be installed. Where they are not likely to be used for any great length of time, the installation of such air-driven equipment, despite its inherent inefficiency may prove an economy, for the low cost of operation where electricity is used may hardly overbalance the high cost of installation.

Backfilling is being studied by several companies in the anthracite region. One is studying the cost of breaking rock for that purpose. Two are making experiments in the use of air, one for backfilling of breaker refuse which is now being performed with water. With the present call for economy, it is essential that no move be made toward backfilling until all

the probabilities of its excessive cost are laid low and until the relative economy of the various methods has been developed. One company has been backfilling with conveyors, using rock of all sizes for that purpose.

Some mines in the past flushed ashes into the mines, but it is now well established that they introduced much acidity, afforded support neither to pillars nor roof and were an insufferable nuisance when an attempt was made to remove the pillars between the ash fillings, the ashes mixing with the coal, whereas breaker waste will form a reasonably dependable pillar which will not acidify water but will support roof well and slough but little when the adjacent coal ribs are removed.

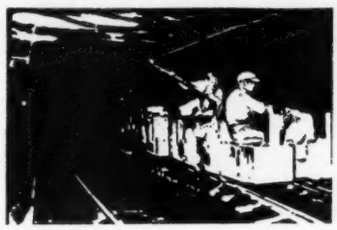
Perhaps it is because of the lesser alkalinity of the water entering the workings that water in storage in the anthracite mines, even when kept at a uniform level, does not, apparently, become alkaline, as in bituminous mines. A large standage which was kept at a given level by overflowing into a water tunnel proved highly acidulous when it was pumped dry. In the anthracite region, the waters percolating from the surface do not pick up calcium carbonate because the measures do not contain it, and they may pass through other mines on the way and so be just as acid as the waters from the seam in which the water is stored.

In general, it is being recognized that it is better, by roadways and boreholes, to take the water to the lowest level and pump it thence by big pumping stations than to put boreholes down to the seams at high levels and void the water from these. What advantage there is in such easier lifts in the latter case is more than lost in the expense in labor and cost of attendance involved in the operation of so many pumping stations. A big station with greater efficiency, closer supervision, and fewer attendants effects an appreciable saving.

Several companies are keeping their locomotive wheels and journals in condition by sending them to a central independent shop to have them brought to standard by automatic electric welding. The machine applies welded material to the journals, flanges and treads at a rate of 16 lb. per minute. After the application the wheels and journals are brought to standard on a lathe with the use of special alloy-steel tools. The parts to be welded are preheated by gas flames to prevent undue strain. Only three such equipments have been installed in this country.

During the past year the major development in anthracite preparation was the starting of construction of the St. Nicholas breaker, Gilberton, Pa., by the Philadelphia & Reading Coal & Iron Co. This breaker will use the Chance sand flotation system and Hydrotators for the cleaning of the coal.

At Loomis breaker, which is a Rheolaveur operation, has been installed in the year past a silt plant of the free-discharge type to treat —$\frac{3}{64}$ in. to zero coal. It has a capacity of 100 tons per day. Probably no plant has been provided in the United States for the cleaning of such fine coal by water without the assistance of oil. The coal below 65-mesh is



removed on a dewatering screen; thus the product shipped runs between $\frac{3}{64}$ and 65-mesh. This product has less than 10 per cent of ash, sometimes less than 8.5 per cent. The five launders in this plant are 10 in. wide and the longest is 80 ft. in length. A free-discharge plant is being erected at Lattimer, Pa., for Pardee Brothers. It will wash a coarser coal, running from — $\frac{5}{16}$ to + $\frac{3}{64}$ in.

At the West End colliery, the West End Coal Co., has erected a breaker with a 15-ft. diameter Chance cone to clean all coal between egg and — $\frac{3}{32}$ in., or barley. Thus, only buckwheat No. 4 is excluded from the lower scale of sizes, and none of the generally merchantable sizes in the upper scale. Susquehanna River water is used without neutralization, as that stream is not acid. The construction work was done by Stuart, James & Cooke. The coal below $\frac{3}{32}$ in. falls into a pocket and can be retained for a future market.

At Von Storch breaker, the Penn Anthracite Mining Co. has doubled the capacity of its plant. Designed originally for 3,500 long tons daily in 8 hours, it is now cleaning 6,000 to 7,000 long tons in a 9-hour day. To obtain this, all that was needed was another conveyor and two extra shakers, and no extra cones. Arrangements have been made to wash birdseye in one rectangular 8x16-ft. Chance cone, and rice and barley in another cone of the same size. The width of the weir is 16 ft. These cones clean 120 tons per hour. About 35 cars of rice and barley are made each day, and about three cars of Buckwheat No. 4. The ash runs from 7 to 8 per cent ash with an occasional car of 9 per cent.

Haddock Mining Co.'s Chance installation at Candlemas Colliery installed last year has a 15-ft. cone which maintains the high density needed to wash such high-gravity anthracite without the use of any other medium than ordinary sand. This cone washes everything but rice and barley.

During the year 92 hydroseparators have been installed with an aggregate capacity estimated at 2,300 tons per hour and 11 Hydrotators having a capacity estimated in all at 325 tons. Simon-Carves washing equipment has been installed by the Glen Alden Coal Co., at the Lance Breaker. The Susquehanna Collieries Co. has been operating a pilot plant to obtain data for the installation of Simon-Carves equipment at one of its breakers.

Tests are being made to determine the availability of the British Pure Coal or Lessing process for the cleaning of anthracite. The suspension medium in this process is a calcium-chloride solution. Some modification in the technique of washing is required because of the high specific gravity of American anthracite.

One of the big problems of preparation is disposal of the bone coal and rock—a big job because of the large volume of both kinds of impurity and because of the limited space for storage. At a breaker operated by one of the large companies, 2x$\frac{5}{8}$-in. washery waste is weighed on a "parts weigher," dumped on a belt running at almost the maximum pitch, which carries the refuse to a tower, where it is dumped on another belt.

This belt runs between pulleys on a long truck mounted on rails and can be pulled forward as need requires. The refuse comes up the belt and is ploughed off by two strips of belting, laid so as to discharge the refuse to the right and left, where it falls into two revolving impellers, which throw it 50 to 100 ft. on either side at right angles to the line of the belt, making a dump which is now 120 ft. high and will soon be higher. It can be made on top 200 ft. wide.

To protect its automatic switchgear in underground stations the Philadelphia & Reading Coal & Iron Co. has

installed cubicles for them, consisting of a welded frame of structural shapes. These, except on the bottom, are inclosed with metal plates to form a case 76 in. high, 60 in. wide and 32 in. deep. The plates on the back are removable; the front consists of two hinged doors equipped with a lock. The frame is braced and equipment so mounted that the entire unit can be turned on its side or its back for ready handling. Suitable lifting rings are provided at the top of each unit for handling by overhead crane or crane hoist.

At the Loree colliery power station purchased power at 60 cycles is about to be used to supplement the 25-cycle alternating current generated at the Hudson Coal Co.'s station. To do this it is necessary to change the cycle of either generated or purchased power. A frequency changer has been installed by the General Electric Co. to change 12,500 kw. at 25 cycles to 60-cycle current.

In order to improve the cleaning of coal by hand picking, airtight reflectors have been introduced, which tightness suffices in steel breakers where arrangements for flooding are not provided. In wood breakers the reflectors should be watertight. In every instance, as the air is dusty, reflectors soon become clouded and have to be cleaned. To guard against accident to operatives in cleaning, the equipment is so arranged that the reflector cannot be removed until the connection is broken. The operative has to pull the plug before he can loosen the reflector. Nor can the operative connect a tool to the junc-

tion, because it is specifically fitted for the illuminating fixture and will not fit any other. A blue daylight cover is being used for the illuminating of picking tables. This gives a light that has been found more effective for coal-picking purposes than a sunlight mercury-arc lamp.

A no-fuse breaker is being used extensively for lighting and other purposes. When a strip in the no-fuse breaker becomes hot, it releases a trigger and shuts off the current. A small knurled handle projects from the face of the equipment, and its position indicates to the operative that current is or is not passing. This handle can be used for opening or closing the switch.

Research into new uses of coal is being pressed by the Anthracite Institute, but regarding this so much has been published that nothing needs to be added. The Lehigh Navigation Coal Co. has recently made studies in the comminution of anthracite by an impact mill, where the particles of anthracite by their mutual impingement break one another and are thus reduced to powder.

Advances in haulage practice at the mines of the Lehigh Navigation Coal Co. in 1931 include the use of one-piece, cast-steel underframes for mine cars, manufactured by the General Steel Castings Corporation. Floor plates and pedestals are cast integrally with the underframe. Two hundred cars were equipped with these underframes during the past fifteen months.

▼ ▼ ▼

# Technical Trends in Preparation Of Bituminous Coal During 1931

(*Continued from page 52*)

quence, a few railroad cars of subnormal quality might inadvertently be shipped, though the average quality for the day is high. Mechanization with its concentration makes this situation the more acute. Such conditions warrant thorough face sampling for guidance in mining. They may even involve changes in mining methods. Certainly they call for closer supervision. Some companies equipped with mechanical cleaning plants are sending cleaner coal to the preparation plant than they loaded from tipples two or three years ago.

During the last few years methods and equipment have been borrowed from ore-dressing practice in metal mining and applied to the process of coal preparation. These applications have in many instances met with success. This suggests the advisability of union of these two interests for the interchange of ideas.

Judging from what has already been accomplished by modern preparation in the marketing field, and from the rapid advances made in the technical problems of the operation, the industry can look with confidence into the future for a satisfactory return on present and proposed investments in the necessary equipment. The real problem to be confronted more than ever before will not be on further great reductions in the impurity of coal but on uniformity of quality and salesmanship which demands a premium for extra fuel value. Without question, the industry is going somewhere with its vigorous preparation campaign.

# RESEARCH GROWS

## + But Development

## Still Left to Individual Effort

AS EVERY new development is sensed at its material beginning, so with research within the provinces of the coal industry. Basing opinion on observation of an industry-wide enlistment in a common cause, with a strategy intended not only to defend but to extend coal's domain, using every available weapon, it may be said that the year 1931 marked the start of a coal research movement which is destined to raise the value of this basic mineral in terms of total and single units of production. For only in the past year has the word research taken on an objective meaning to the coal industry and dependent interests.

Stark realization of the need for action was never more manifest. Something must be done—but what? Casting about for ways and means, the industry discerns several possibilities, one being to utilize principles which will yield profit from the sale of raw coal. But the while, there persists that mental whispering, "All well and good, this predilection; but such action of itself will not greatly widen the outlet for production; it spells contraction and great loss of money already invested in properties to be abandoned." So the industry knows it must go further, and that the step beyond must be in the field of research. It was research without the industry that shrunk coal tonnage to low level; so it must be research within the industry alone that will effect recapture.

Signs of this new consciousness were more apparent last year than any other in the past. State, interstate and national discussions of the causes of tonnage losses and remedies bespoke an aroused concern. The Third Bituminous Coal Conference, though of long planning, fell auspiciously at a time of greatest need. The Committee of Ten—Coal and Heating Industries completed a survey of research in coal and its utilization "to serve as a sort of a guide in coordination of research effort." A broad program of research in the mineral industries of Illinois was started by a large appropriation to the state geological division. Several coal companies quietly reported sizable expenditures on problems in coal beneficiation. Two Southern railroads investigated the suitability of coking coals originating on their tracks for combustion in domestic stokers. The Anthracite Institute was engaged in several research projects dealing with direct and non-fuel uses of anthracite. *Coal Age* proposed an industry-supported research corporation.

In the fiscal year ending June 30, 1931, the U. S. Bureau of Mines, at its Pittsburgh, Northwest and Southern experiment stations conducted research on over fifty problems relating to coal. Some of these studies were carried out cooperatively with colleges, as the accompanying table indicates. In 1931 the Bureau spent a gross of about $367,000 on coal research.

The Bureau's work is laying the foundation for the kind of a research structure the coal industry greatly needs. Here is but one example: Research is indicating new methods of producing widely used organic chemical compounds, such as gasoline and alcohol from chemical elements. Gasification of coal will yield carbon monoxide, ethylene and hydrogen, which can be used in the synthesis of such useful products. Realizing that the chemistry of these analytical processes is not well understood, the Bureau is researching in this field, the objective being to furnish the theoretical basis for industrial development.

A significant point is made in the recommendations on research in the annual report of the Bureau's director to the Secretary of Commerce. It reads: "Although service work such as the Bureau's approval system, its inspection and analysis of fuels, and its fuel-economy work in government plants yields the most immediate and obvious returns for the money expended, nevertheless more lasting, more far-reaching, and ultimately greater returns may come from well-planned research work. These returns are far less apparent, are rarely immediate, and may seem intangible, but they are none the less real.

"As appropriations of fixed sums are made year by year, the proportion that can be spent for research work continually decreases because of the natural growth of service work to which the Bureau has become committed. The future is thus robbed for the sake of immediate gain. This situation is unfortunate. Its first effect is to make us hesitate to undertake further service work, however useful it may be, since the money received from commercial concerns in payment for this bureau's work reverts to the Treasury of the United States and is thus completely lost to the Bureau of Mines, thereby decreasing our funds for research investigations by the sums so represented. When research in any field in the mineral industries can be afforded by the federal government, it is believed that increased appropriations for that purpose will be a good investment for the future."

One of seven studies in progress last year at the engineering experiment station of the Ohio State University, this jointly with Battelle Memorial Institute, is a determination

## Coal Researches in Progress or Completed During 1931

| Problem | Study by | Status |
|---|---|---|
| *Air Pollution; Smoke Abatement* | | |
| Air Pollution Investigation | Mellon Institute of Industrial Research | A long-time study; to continue |
| Intensity of Shade Caused by Solid Particles in Atmosphere, Determining of | Stevens Institute of Technology | Begun in 1930; to continue |
| Solids in Gas Streams, Test Methods and Evaluation of | Stevens Institute of Technology | Contd. from 1930; completion of first report expected in 1932 |
| Stack Gases and Removal of Sulphur from Coal | University of Illinois with Utilities Research Corporation | Contd. from 1930 |
| *Briquetting* | | |
| Briquetting, Trying Old and New Ideas | Battelle Memorial Institute | Begun in 1931; to continue |
| *Carbonization (see also "Chemistry and Physics" and Gasification")* | | |
| Carbonization Properties of West Virginia Coals | West Virginia University | Contd. from 1930 |
| Coke Making and Gas Properties of Coal, Development of Methods for Determining | U. S. Bureau of Mines with American Gas Assoc. | Contd. from 1930 |
| Coke Making, Utilization of Coking Coals | Mellon Institute of Industrial Research | ..... |
| Coking, Phenomena of, Under Low Temperature | Pennsylvania State College | Contd. from 1930 |
| Coke Structure, Effect of Heavy Gravity Impurities | Koppers Rheolaveur Co. | Begun in 1931; to continue |
| Plastic State of Coal During Coking | U. S. Bureau of Mines | Contd. from 1930 |
| Plasticity of Coal | U. S. Bureau of Mines | Contd. from 1930 |
| Lignite, Carbonized, Structure of | University of North Dakota | ..... |
| Low-Temperature Carbonization of Kentucky Bituminous Coals and Cannel | University of Kentucky | Under way 12 years; to continue |
| *Chemistry and Physics of Coal and Coal Analysis* | | |
| Action of Nitric Acid on Coal in Anhydrous Media | West Virginia University | Contd. from 1930 |
| Chemistry of Decay in Relation to Coal and Peat Formation | U. S. Bureau of Mines with Carnegie Institute of Technology and University of Pennsylvania | Contd. from 1930 |
| Chlorination to Determine Nature of Coal Substance | Carnegie Institute of Technology | Contd. from 1930; to continue |
| Heating Rate Influence on Properties of Coal Derivatives; Energy Relation Involved (as a separate problem) | Carnegie Institute of Technology | Contd. from 1930; to continue |
| High-Vacuum Distillation of Coal | Carnegie Institute of Technology | Contd. from 1930; to continue |
| Light Oils, Development of Methods for Analyzing | U. S. Bureau of Mines | Begun in 1931 |
| Low-Temperature Tar, Composition of; Symmetrical Xylenol, Stability of | U. S. Bureau of Mines, with Carnegie Institute of Technology | Begun in 1931 |
| Low-Temperature Tar, Methods for Analyzing, Development of | U. S. Bureau of Mines | Begun in 1931 |
| Micro Chemical Methods for Coal Analysis, Development of | Carnegie Institute of Technology | Started in 1931; to continue |
| Oxidation, Kinetics of | West Virginia University | Contd. from 1930 |
| Oxidation, Low Temperature | Carnegie Institute of Technology | Started in 1931; to continue |
| Reactivity of Coals, Comparison of Permanganate and Chlorate Methods for Determining | U. S. Bureau of Mines | Begun in 1931 |
| Solvent Extraction Studies of Bituminous Coal | West Virginia University | Contd. from 1930 |
| Solvent Extraction | Carnegie Institute of Technology | Started in 1931; to continue |
| Solvents, Extraction of Coal with Development of Analytical Methods for | U. S. Bureau of Mines | Begun in 1931 |
| Spontaneous Combustion of Coal, Study of Causes of | Purdue University | ..... |
| "True" Density Study of Coal and Coke | Carnegie Institute of Technology | Contd. from 1930; to continue |
| Ulmens and Resistant Plant Residue in Coal, Study of Methods for Separating | U. S. Bureau of Mines | Begun in 1931 |
| *Combustion of Coal and Coal Products* | | |
| Burning Characteristics of Pulverized Fuels (to include all important coal beds) | Battelle Memorial Institute | Begun in 1930; to continue |
| Combustion in Ceramic Kilns (Chiefly Coal) | Ohio State University with U. S. Bureau of Mines | Contd. from 1930 |
| Combustion of Pulverized and Lump Coal | West Virginia University | Contd. from 1930 |
| Combustion Tests of Washed Ohio Coal (1930 tests were on unwashed coal) | Ohio State University | Contd. from 1930; to continue |
| Comparative Costs of Coal and Natural Gas in Domestic Heating | University of Arkansas | Completed in 1931 |
| Cokes for Use in Domestic Furnaces, Determination of Relative Availability of | U. S. Bureau of Mines | Contd. from 1930 |

of the variations in the characteristics of coal and impurities at different elevations in one of the most important Ohio seams. A wide difference both in structure and chemical analysis (ash and sulphur distribution and ash fusion characteristics) between the different benches in many coal seams is known to exist. With exact knowledge of these variations, two possibilities are suggested: (1) to learn the effect on utilization upon mixing different percentages of the various benches and (2) to revise mining methods so as to provide a coal of more suitable quality for particular purposes.

Public health is involved in air pollution, for which reason medical men and civic organizations are waging a fight which may go hard on users of coal. In their ignorance of technical difficulties, the opposition may make demands impossible of attainment at the time. The problem, therefore, should be considered vital by the bituminous coal industry.

Passage of a state appropriation bill on July 1 made available to the Illinois State Geological Survey Division a fund of $468,890 for a two-year program of research in the mineral industries within the state. This fund covers laboratory quarters, equipment and personnel. Coal problems will represent a large portion of the expenditure. The studies will embrace the economics of distribution as well as chemical and physical aspects and processing.

During the year two commercial applications were made of coal-cleaning principles determined by earlier research of the U. S. Bureau of Mines in cooperation with the University of Washington at the Northwest Experiment Station. On the strength of the studies, one washery installed a hydraulic classifier for the re-treatment of middlings from tables, which is said to give a substantial increase in percentage of recovery. Guided by the proof established by investigation at this station that the washing of coal results in a diminution of clinker formation, even though the ash-softening temperature of the coal remains the same after washing as before, a commercial jig plant was installed.

Starting with coal, limestone, salt and water research, chemists in the duPont laboratories have created, after many years of experimentation, a synthetic rubber which rivals and in some respects, it is said, excels that furnished by nature. This new product, known as Du Prene, is produced from acetylene, a coal and

limestone derivative, as the primary raw material. A plant is now under construction for its manufacture.

Facilities for manufacturing synthetic ammonia, a product derived from coal, are now overdeveloped. An outlet for this surplus capacity is being sought in new uses. A new development which may have considerable effect on consumption is the cracking of ammonia into its constituent gases evolved by the duPont Company. An apparatus costing about $600 has been devised for dissociation of liquid ammonia right in the plant where the hydrogen or nitrogen is to be used. After cracking, the mixture of these two gases can be passed through a special combustion furnace, where, with the proper quantity of air, the hydrogen is burned, leaving nitrogen. If hydrogen is desired, the nitrogen remains as an inert. This roundabout method of dissociating hydrogen or nitrogen from ammonia, which itself is derived by synthesis involving manufactured hydrogen, effects great savings in the delivered cost of either of these two gases.

The big saving is in the distribution cost. One hundred pounds of liquid ammonia, the contents of one standard cylinder, will yield the equivalent of 17 cylinders of hydrogen or 39 cylinders of nitrogen. The chief uses now apparent for the dissociated ammonia are welding, reduction, brazing and hydrogenation.

An interesting study of the application of coal as a fuel to mechanical stokers for domestic heating is being made by two great railroads tapping Southern mines, individually. One of these roads is the Norfolk & Western Railway Co., which, as a result of many months' work, has already released a report on the suitability of two well-known stokers. The tests are being conducted under actual conditions in a residence, and an elaborate instrument set-up has been made so as to guarantee the accuracy of results. High- and low-volatile coals are involved in the tests, the range being from 28.68 to 36.82 per cent. This company will continue the study, using other makes of stokers.

A similar study was begun late in the year by the Chesapeake & Ohio Railway Co. in cooperation with the University of Kentucky, the carrier doing the financing. The coal tested will comprise carload samples from sixteen different seams. Each sample is screened to various definite sizes required for test and a proximate analysis made of each size as fired, an ultimate analysis being made of

**Coal Researches in Progress or Completed During 1931—(Continued)**

| Problem | Study by | Status |
|---|---|---|
| Domestic Automatic Stokers, Tests of, Using High and Low Volatile Coals on Line of N. & W. Railroad | Norfolk & Western Railway Co. | First report out; to continue |
| Domestic Furnaces, Tests of Secondary Air Mixing Devices for | U. S. Bureau of Mines | Contd. from 1930 |
| Fuel Bed Characteristics, Effect of Pre-Heated Air on | U. S. Bureau of Mines | Contd. from 1930 |
| Heat Insulation Studies | Mellon Institute of Industrial Research | ..... |
| Home Heating, Improvement of Equipment for | Mellon Institute of Industrial Research | Contd. since 1929 |
| Mechanical Stokers, Their Adaptability to the Home and Small Industrial Plant, Using Coals Originating on the C. & O. Railroads | Chesapeake & Ohio Rwy. Co., with University of Kentucky | Begun in November; to continue |
| Mechanism of Combustion of Solid Fuels | Carnegie Institute of Technology | Contd. from 1930; to continue |
| Power-Plant Survey; Equipment, Fuel and Efficiencies | Ohio State University | Begun in 1931; to continue |
| Radiation from Pulverized-Fuel Flame | Battelle Memorial Institute | Begun in 1931; to continue |
| Removal of Ash as Molten Slag from Powdered Coal Furnaces | U. S. Bureau of Mines with A.S.M.E. | Contd. from 1930 |
| *Constitution and Properties of Coal* | | |
| Absorption of Gases by Coal | U. S. Bureau of Mines | Begun in 1931 |
| Agglutinating Tests of Coal, Standardization of | U. S. Bureau of Mines with Carnegie Institute of Technology and University of Pennsylvania | Contd. from 1930 |
| Alabama Coals, Classification of | U. S. Bureau of Mines | Begun in 1931 |
| American Coals, Analysis and Composition of | U. S. Bureau of Mines | Contd. from 1931 |
| Ash-Making Constituents and Fusibility of Coal | Illinois State Geological Division | Contd. from 1930; to continue |
| Friability of Anthracite, Methods to Determine | Pennsylvania State College | Begun in 1931; to continue |
| Friability Determination, Development of an Acceptable Method | U. S. Bureau of Mines with University of Washington | Begun in 1930 |
| Occluded Gases in Coal | U. S. Bureau of Mines with Carnegie Institute of Technology | Begun in 1931 |
| Physical and Chemical Characteristics of No. 6 Seam Coal | Illinois State Geological Division | Begun in 1931; to continue |
| Physical and Chemical Properties of Coal in Relation to Classification | U. S. Bureau of Mines | Begun in 1931 |
| Physical Characteristics of West Virginia Coals | West Virginia University | Contd. from 1930 |
| Physical Components, Chemical Properties of Indiana Coals | Indiana State-Geological Division | ..... |
| Plant Substances in Illinois Coal | Illinois State Geological Division | Begun in 1931; to continue |
| Unit Coal Values of Illinois Seams | Illinois State Geological Division | Contd. from 1930; completed |
| Water in Coal, Condition of | Pennsylvania State College | Contd. from 1930; to continue |
| *Distribution and Economics* | | |
| Economic Study, Pennsylvania Minerals | Pennsylvania State College | Completed for Coal |
| Normal Moisture Content, Determination of, for Making Price Adjustment for Exposure in Shipment | State University of Iowa with Iowa Geological Survey | ..... |
| Shipments of Coal Into and Out of Illinois | Illinois State Geological Division | Begun in 1931; to continue |
| *Gasification* | | |
| Hydrocarbons from Water Gas, Synthesis of; Reaction Mechanism and New Catalysts, Study of | U. S. Bureau of Mines | ..... |
| Producer Gas; Gasification of Carbon, Effect of Sodium Carbonate Upon | University of Michigan | Contd. from 1930 |
| Utilization of a New Group of Coal Products Obtained in the Purification of Gas, Development of | Mellon Institute of Industrial Research | ..... |
| Water Gas Generation From Bituminous Coal | University of Michigan | Started in 1927 and continued |
| *Mining (see also "Preparation")* | | |
| Accident Studies; Hand vs. Mechanical Loading | University of Illinois | Begun in 1930; completed in 1931 |
| Change in Quantity of Dust and Strength of Ignition Source, Effect of, on Explosibility of Coal Dust | U. S. Bureau of Mines | Contd. from 1930 |
| Coal-Dust Inflammability, Effect of Size on | U. S. Bureau of Mines | Contd. from 1930 |
| Compressibility and Crushing Strength of Pittsburgh Coal Bed | U. S. Bureau of Mines | Contd. from 1930 |
| Detonation of Explosives, Temperature Attained by the Products of | U. S. Bureau of Mines | Contd. from 1930 |

each carload lot. Representative makes of the principal types—underfeed screw, underfeed ram or plunger and the overhead unit—are being tested. The tests also include stokers for small industrial boilers of 50 to 75 hp. capacity.

Scores, if not hundreds, of chemical products companies are engaged in research on coal-tar derivatives—dyestuffs, pharmaceuticals, disinfectants, and various other synthetic products. Unfortunately for the purposes of this review, the studies, being made for private gain, are veiled in secrecy. However, some idea of the possible future extension of coal derivative utilization is given in the statement of a comprehensive study being made by the Mellon Institute of Industrial Research: One of the many coal products is finely divided, almost colloidal, sulphur; and of this, several million pounds has already been sold to protect orchard and other crops from fungus diseases and pests. An extended medical investigation has shown that this sulphur gives excellent results in the treatment of certain skin disorders. Another new coal product is ammonium thiocyanate, which is valuable in the manufacture of synthetic resins, as a weed killer, etc.

What of the future of such research in its relation to the coal industry? That must all depend on the receptiveness of the operators and their vision to see and grasp the manifold opportunities which the material they are now producing in the raw state offers. Certainly no other raw material offers so many possibilities in a gamut running from perfume scents of ethereal volatibility to massive, almost indestructible, solids. New uses will be developed whether or not the coal operators themselves take part. Either way, the producers are destined to gain, but infinitely more through the channels of processing where the big profits are made.

The situation is a challenge to the industry. Is it to sit back and do nothing, while others come in, as did the power utilities, and snatch away the cake, leaving only the crumbs for the host who did the serving? The sugar industry, with a hydrocarbon product which must be grown at a considerably greater cost than that incurred in the production of coal, shows signs of giving the coal industry another major setback. It has begun an ambitious program of finding new uses for sugar along lines which, if successful, will be highly competitive with coal processing.

**Coal Researches in Progress or Completed During 1931—(Concluded)**

| Problem | Study by | Status |
|---|---|---|
| Electrostatic Phenomena in Mines | U. S. Bureau of Mines | Contd. from 1930 |
| Explosives, Physical Tests of, to Determine Their Permissibility in Coal Mines | U. S. Bureau of Mines | Contd. from 1930 |
| Flame Propagation, Effect of Electric and Magnetic Fields on | U. S. Bureau of Mines with Carnegie Institute of Technology | Contd. from 1930 |
| Gaseous Explosives, Kinetics and Mechanisms of | U. S. Bureau of Mines | Contd. from 1930 |
| Ground Movements and Subsidence | U. S. Bureau of Mines | Contd. from 1930 |
| Inflammability of Coal and Other Mineral Dusts | U. S. Bureau of Mines | Contd. from 1930 |
| Inflammability of Gases and Vapors | U. S. Bureau of Mines | Contd. from 1930 |
| Liquid Oxygen Explosives, Safe Handling of | U. S. Bureau of Mines | Contd. from 1930 |
| Material Used for Rock Dust Barriers, Determination of Moisture Absorbing Wetting and Caking Characteristics of | U. S. Bureau of Mines | Contd. from 1930 |
| Methods and Costs, Coal Mining | U. S. Bureau of Mines | Contd. from 1930 |
| Mines Explosives, Analytical and Testing Methods for, Development of | U. S. Bureau of Mines | Contd. from 1930 |
| Mine Gases, Origin, Composition and Laws of Flow of | West Virginia University with Consolidation Coal Co., W. Va. Geological Survey and W. Va. Dept. of Mines | Started in 1931; to continue |
| Mine Ventilation, Energy Losses in | University of Illinois | Contd. from 1930 |
| Occurrence of Bumps in Mines | U. S. Bureau of Mines | Contd. from 1930 |
| Propagation of Flame, Behavior of Different Coal Dusts in | U. S. Bureau of Mines | Contd. from 1930 |
| Relation Between Mining Methods and Accidents From Falls of Roof and Coal | U. S. Bureau of Mines | Contd. from 1930 |
| Rock Dusting of Coal Mines | U. S. Bureau of Mines | Contd. from 1930 |
| Roof Action and Subsidence, Study of by Laboratory Methods | Columbia University | Contd. from 1930; to continue |
| Sealing Abandoned Mines; Determining Cause of Alkalinity in Others | U. S. Bureau of Mines | Contd. from 1930 |
| Trailing Cables, Relative Merits of Different Makes of | U. S. Bureau of Mines | Begun in 1931 |
| Waste Water from Mines, Disposal of | U. S. Bureau of Mines | Contd. from 1930 |
| *Non-Fuel Uses of Coal* | | |
| Anthracite, Non-Fuel Uses | Anthracite Institute and Pennsylvania State College | Contd. from 1930; to continue |
| Synthetic Rubber from Coal | E. I. du Pont de Nemours & Co. | Commercial Plant being erected |
| *Preparation of Coal* | | |
| Ash and Sulphur Distribution in Ohio Coal Seam With View to Selective Mining | Ohio State University with Battelle Memorial Institute | Begun in 1931; to continue |
| Beneficiation of Iowa Coals by Washing | State University of Iowa | Contd. in 1931 |
| Cleaning Experiments, Using Tables, Jigs and Classifiers | Battelle Memorial Institute | Begun in 1931; to continue |
| Dustless Coal Treatment, Methods of | Indiana State Geological Survey | Begun in 1931; not completed |
| Flotation of Coal, Effect of Hydrogen-Ion Concentration | Pennsylvania State College | Contd. from 1930 |
| Froth Flotation of Fine Coal | U. S. Bureau of Mines with University of Washington | Begun in 1930; to continue |
| Grinding of Coal, Methods of Evaluating Surface | Battelle Memorial Institute | Begun in 1931; to continue |
| Lignite, Drying of, by (1) Fleissner Method; (2) Oil-Steam Emulsion | University of North Dakota | Contd. from 1930 |
| Lignite Steam-Dried, Colloidal Structure of | University of North Dakota | ..... |
| Lignite Steam-Dried, Micro-Structure of | University of North Dakota | ..... |
| Performance of Selected Washeries in Alabama, Determination of | U. S. Bureau of Mines with University of Alabama | Contd. from 1930 |
| Sampling Pulverized Coal in a Coal-Air Stream | Ohio State University | A continuation; suspended temporarily |
| Selective Separation of Coal Substances in a Seam With Effect of Cleaning on Fusion Point | State University of Iowa | Begun in 1931; to continue |
| Tabling Studies of Blue Creek Seam Coal | U. S. Bureau of Mines with University of Alabama | ..... |
| Washability of Illinois Coals | University of Illinois | Contd. from 1930 |
| Washability of Mary Lee Seam Coal | U. S. Bureau of Mines with University of Alabama | ..... |
| Washability Studies by Float and Sink Methods | Battelle Memorial Institute | Begun in 1931; to continue |
| *Storage of Coal* | | |
| Storage of Coal | Ohio State University | Begun in 1931 |
| Storage Methods for Iowa Coals | State University of Iowa | Contd. from 1930 |

# MECHANIZATION + Meets Gruelling Test Imposed by Industrial Depression

MECHANICAL LOADING met its first real gruelling test during the calamitous days of 1931—and came through with flying colors. In the face of the sharp drop in total production of coal as a result of the general industrial depression and further inroads into consuming markets by competitive fuels, all data now available point to a substantial increase in the percentage of coal loaded mechanically last year as compared with 1930, when 10.5 per cent of the deep-mine bituminous output was so handled. This review does not include the mechanization of anthracite mining, which is featured in an article beginning on p. 53.

Although some sections and mines reported a decrease in the actual tonnage mechanically loaded, when these decreases are set against the losses in hand-loaded tonnage, the showing for the machine is impressive. In Illinois, for example, total output last year was 9,301,194 tons under 1930 figures, but hand-loaded tonnage showed a loss of 9,067,377 tons.

Reports from the Far West show that recession in consumption and competition from natural gas blocked an increase in mechanical production but did not lessen belief in the advantages of mechanization. An operator in southern Wyoming believes that machines and methods capable of meeting every condition in the state have been developed. He thinks, however, that mechanical loading will go forward at a reduced rate until the necessity for opening new mines is met. Certain mines nearing exhaustion, but which are kept alive by financially weak companies, will not be mechanized. No progress has been indicated for northern Wyoming or Colorado. But the year 1931 brought initial mechanization of mines in Montana near to completion. Utah buckled down to the problems immediately at hand. During the year there was less experimenting with new types of machines and changes in mining systems. More attention was paid to results.

In the last few years, Ohio as a state has been depending more and more on modernization of properties to hold its share of production, and 1931 was no exception, though activity was less than the year before. One company with five operating mines found it profitable to replace all of its shortwall cutters with combination cutting and shearing machines, at the same time replacing light-weight steel with 30-lb. rail in rooms and in panel entries. This company has increased the concentration and tonnage of hand loaders by putting drilling, shooting, and tracklaying on company time. The aim is to approach factory practices.

The greatest activity in western Pennsylvania was in new installations of pit-car loaders, where probably more machines of this type were installed than in any other field in the country, in which case Illinois would fall for the first time from its leadership in the installation of these machines. Most of the new units in the former field represented initial installations. Many of these, however, are said to be deliveries made early in 1931 on 1930 contracts. The number of new installations, chiefly conveyors, made in central Pennsylvania was substantial.

Considerable activity was evidenced in Maryland. In several instances thin coal, as low as 2 ft., was worked in successful competition with operations mining thicker coal. This outcome is reported altogether due to good management and the use of improved types of conveyors. One large company made an important installation of mining machines and conveyors, the latter to supplement those already in use. Features of the new equipment were that the mining machines are of the approved type and that the moving parts of the conveyors are carefully guarded.

West Virginia, particularly the southern portion, and eastern Kentucky appear to have been less sympathetic to mechanization than the year before. A number of pit-car loaders were introduced in western Kentucky, one mine being completely mechanized with this equipment. Virginia held its own. Some progress was made in Tennessee and also in Alabama, where additional scrapers were installed.

In the opinion of the majority of the operators who are now using the machine, mechanization will continue to grow steadily. Much depends on the willingness of labor for the continuity of the expected progress, inasmuch as these operators stand willing to expand machine use as conditions warrant. Labor has resented the introduction of machines, espe-

## *Illinois Figures*

**While comparatively few new mechanical loading units were installed in Illinois during 1931, nevertheless, production from these machines showed a decided advance over the tonnage from hand methods on the basis of 1930 output. Figures comparing tonnages from the two methods for the two years reveal that total production for the state fell from 52,028,612 tons in 1930 to 42,902,944 tons in 1931, a loss of 9,125,618 tons. Yet mechanical output dropped only 223,817 tons, from 23,342,932 tons in 1930 to 23,119,115 tons in 1931, whereas hand methods showed a loss of 9,067,377 tons, the figures being 22,667,292 tons for 1930 and only 13,599,915 tons for 1931. In other words, practically all of the tonnage drop in the state was lost by unmechanized operations.**

cially in slack times, for the sole reason that the individual is not sure of his job, in the knowledge that the machine will reduce the opportunity of the mass to work. But labor employed in mechanized mines is not generally antagonistic. Their feeling is a manifestation of appreciation for the operators' ready acceptance of the financial sacrifice which division of work creates, and a growing realization that progress cannot be stopped. Chief opposition is coming from the radicals and from those miners who have not yet made direct contact with mechanization.

An increase in the wage differential last year between organized and unorganized fields added to the difficulties represented in sharing out of jobs and in curtailed operation. This widening of the margin certainly removed some of the advantage of mechanization. But without the machine, much of the now mechanized tonnage would have been replaced by production from cheaper labor.

That Illinois has not shown more mechanization activity is partly due to the approach of March 31, at which time a new wage contract will be negotiated. The operators feel that they must know what the new contract will bring before making definite plans.

Responses express optimism for mechanization in the future. One operator states: "Our mine during the last two years has been mechanized to about 90 per cent, and we intend to continue this program and, further, to replace present equipment with more efficient units." Another writes: "We have completed the mechanization of four mines. Thereby we have been able to make substantial reductions in cost and indirect savings in haulage, timbering, and track expense." Still another has decided as absolutely essential that complete mechanization of coal mining be accomplished at the earliest moment; he believes that the mines lagging behind in this movement will be so hopelessly outdistanced that they will be compelled to go out of business.

In the earlier days of mechanization the inherent possibilities of improving safety were sensed and preached, but in actuality these were submerged by the introduction of machine hazards and others arising from unfamiliarity with the work. Gradually the newly introduced hazards have been safeguarded, with the result that the machine has at last been given the opportunity to demonstrate its safety influence in the operation.

There can be no question of the observation that vast improvement was made in the design and construction of equipment furnished in 1931. Increased sturdiness was a marked characteristic of the general line. Sealed bearings are now a common demand. Machinery with unguarded parts is no longer accepted. Manufacturers of pit-car loaders have made changes which cut down the number of visits that this light machine in heavy service had had to make to the machine shop for reconditioning. On one type of room conveyor there appeared a drive unit with motor and reduction gears in a single housing. Builders of mobile loaders have not ignored the demand for equipment with lower maintenance cost. Special types of cutting and loading machines were reduced to new lows in over-all height. In the development of these changes the mine operators have played an important part.

One of the biggest advances has been made in cutting-machine design, notably in the track-mounted type which has given a new meaning to maximum shift production. The cutting of over 1,000 tons by one machine in a single shift may seem beyond ordinary reach, but that production has at least been attained on occasion. Flexibility and power are the new requirements. Several noteworthy advances have been made with respect to flexibility. At last a machine has been developed which will shear from a curved track, the secret being a differential motion in the turning of the table as the machine advances to the back of the cut. The bar on several of the machines can be raised or lowered or tilted at will to conform with irregularities in the cutting plane.

Desire of mining men for a cutter bit superior to the common bit has been met. In some cases the improvement has been accomplished by spot welding an alloy of high rank in the metal hardness scale. In others, the improvement has been achieved by forming the entire bit of a super alloy steel such as silico-manganese or tungsten-carbide. One manufacturer offers a cutting chain of nickel molybdenum.

A commentary on the many improvements in electric coal drills has been the continued rapid advance in their use. Speedy advance and quick withdrawal are the most apparent features. At an Indiana mine, a hitch drill was developed which will put in an 8-in. hole to a depth of 2½ ft. in hard slate within 2½ minutes. The year also saw increased use of the non-flammable gas cartridge for blasting.

Modern mine cars have quickly demonstrated their economy. One operator reported a calculated saving of eight cents a ton through replacement by a better and larger car. At an Ohio mine a 5-ton car on eight wheels was introduced.

About the only modern mining device which has made no progress in use is the steel roof support. The best that can be said is that a new type was added last year to the few already available. Yet there is need for the utilization of supports of this kind under some conditions. That development, apparently, is one for the future.

There has not been the trouble expected by some in the use of small blowers. They have proved their reliability for continuity of operation. At some mines, it is reported, the miners have found the blower so beneficial to the miners' health that they would resist its withdrawal. The requirement of ample light in mechanized operations has spurred the installation of electric cap lamps in mines which under hand operation refused to consider them.

One slowly evolved development which at last appears above the surface comes as a jolt to those who have satiated their desire for progress merely by adherence to old mine layout methods. That is the growing divergence from the standard room-and-pillar system. It is beginning to be whispered that because my father did thus and so before me is real warranty for changing now. Today it is virtually impossible to classify layouts as being modifications of a few standard systems. For example, under which system would the plan now in regular operation fall of driving a battery of rooms for 2,000 or more feet? One finds long rooms, short rooms, wide rooms, narrow rooms; long faces, short faces; complete extraction, partial extraction; mining advancing and mining retreating, slabbing, mining on the face, working on the butt, or at an angle to both in almost every conceivable combination, largely with a view to satisfy machine adaptability as well as roof and other mine conditions. Eyes become mechanical, close on precedent. It is this abandonment which has caused decided, if sometimes costly, advances in mechanization. Perhaps by such methods the industry may learn yet how to recover pillar coal by mobile loading machines under a wide variety of conditions.

# 1931—A RECORD YEAR + In Accident Prevention In Coal Mines

By SCOTT TURNER

*Director, U. S. Bureau of Mines*

FROM the viewpoint of accident prevention — mining coal without killing men—the year 1931 was the banner year in the coal-mining industry of the United States. In most respects it was a trying year, and one which everyone hopes may not be experienced again; still, it had a bright side in that it was a period during which coal was mined at a smaller cost in human life than this nation has hitherto ever known. Indeed, it is believed that a new record among large coal-producing nations was established last year by the American coal-mining industry.

We must go back almost a quarter of a century to find a year when the tonnage of coal mined in the United States reached so low an ebb as it did in 1931, but we must go still further back, to the closing year of the previous century, to find a year when so few men lost their lives from accidents in the mines. When tonnage is considered in relation to accidents, the record for 1931 surpasses that of all previous times.

It is too early to evaluate the importance of the various factors that contributed to the industry's success in conducting operations last year with so small a number of accidents. Certain influences doubtless played a part. These factors had beneficent results, but they may be hard to duplicate when better market conditions return and normal operations are resumed. Those of us who are interested in making coal mining a safer occupation should not center our attention on last year's record without at the same time giving serious thought to how 1932 and subsequent years may be made to continue to show improvement in line with last year's excellent accomplishment.

The industrial depression, and its consequent effect in curtailing demand for coal, led to material reductions in the number of men employed. The miners who were retained on company payrolls to produce such coal as the market warranted were, in the main, the more efficient workmen, and, to a large extent, those who knew how to safeguard themselves from accidents.

Scott Turner

With the release of large numbers of workers went many accident-prone employees. Among the men remaining in the mines there was a natural increase in diligence in the performance of work, and in care to avoid accidents that might cause injury and loss of time or result in damage to mining property. Such care and diligence by employees make for safety. These qualities, however, the mining companies will find it more difficult to command when normal markets return, when employees are under less economic urge to hold their jobs and when operators find it necessary to reemploy many of those who were among the first to be released.

Other influences, however, not connected with poor markets and reduced working forces, contributed to the industry's safety record during the year. These influences are cumulative in their effect, and their results, in part, were seen in 1931. The increasing number of mining companies that employ rock dust to prevent widespread explosions of gas and coal dust; the substitution of permissible explosives for the more dangerous black powder for blasting coal; the installation of permissible electric equipment for haulage and mining operations; the rapidly increasing numbers of mine employees who are being trained in methods of first aid and mine rescue, and a general awakening on the part of the coal industry to a knowledge of the vital relation between safety and profits; these are the basic factors that contributed to last year's record and these are the factors on which the coal industry must rely in the future to avoid a rise in the life-cost of coal.

The actual cost of the 438,000,000 tons of coal taken from the mines last year was 1,430 lives, as nearly as we can calculate from information now available. Thus every fatal accident represented a production of 306,000 tons of coal. Later returns may alter this figure slightly, on account of some injuries that had not terminated fatally when the year closed, but these cases are not likely to reduce the figure below the 300,000 mark.

The number of fatalities represents a saving of about 600 lives as compared to the preceding year. While much of this saving was due only to the fact that many mines were not in operation, a large portion of it re-

flects a genuine increase in safety under which mining operations were conducted.

Five years ago, the United States produced only 261,000 tons of coal for each life lost; ten years ago the output per death was 254,000 tons; twenty years ago it was 187,000 tons; thirty years ago it was 185,000 tons; and forty years ago, 165,000 tons. Thus it will be seen that during the past 40 years the life-cost of coal has been reduced about 45 per cent. In other words, the industry produced nearly twice as much coal per fatal accident in 1931 as it did four decades ago.

The prospect is bright for a continuation of this progress, because an increasing number of mining companies are now operating with no fatal accidents. Indeed, in recent years, some companies have operated not only without fatal accidents but also with an extremely small number of non-fatal accidents, even those of so slight a nature as to disable an employee for only one day.

It is these companies, and others emulating their example, that are demonstrating the possibility of operating coal mines with as few injuries to their employees as occur in other industries where operations are conducted entirely above ground in natural light instead of underground in semi-darkness, due to inadequate and artificial illumination. As a method of promoting safety, the possibility of floodlighting working places in coal mines seems worthy of serious investigation, as such lighting, if it can be generally adopted in coal mines without introducing new and serious hazards or embarrassing increases in costs, might aid in preventing many accidents that now occur largely because of insufficient illumination.

Falls of roof and coal in 1931 were responsible for 824 fatal accidents, according to latest reports. This number represents a death rate of 1.88 per million tons of coal produced, the preceding year's rate being 2.02. A reduction of the fatality rate from falls represents a greater saving of life than would a corresponding reduction in other types of accidents. This is because falls cause about 50 per cent of all fatal accidents in coal mines.

The prevention of accidents from falling rock or coal is more dependent, perhaps, on cooperation between management and employees than is the prevention of other classes of accidents. The practice that has grown whereby the coal miner works alone or with a single helper, in a room isolated from other working places, has put a special responsibility upon each miner to keep his working place safe. This he may do either by promptly taking down loose rock or by supporting the roof with props when the rock cannot be taken down. The miner is in the best position to discharge this duty, because he is constantly present as roof conditions change with the extraction of coal, but the failure of miners thus to protect themselves has been a prolific source of accidents. The companies are, of course, obligated to furnish suitable props and deliver them to places convenient to each miner.

Haulage accidents underground caused 240 fatalities last year, the resulting rate being 0.55 per million tons, as compared with 0.61 for the year before. Many accidents of this type are caused by men getting on or off moving cars, a practice which is against the rules of most companies; others are sometimes traceable to the operating company's failure to maintain sufficient space between the tracks and the sides of the haulageways, with the result that employees are killed by being squeezed between cars and walls. Still other injuries are due to runaway cars or to the cars jumping the tracks, a type of accident which companies might often prevent by providing proper haulage equipment and roadbeds; or employees might exercise more care when operating cars and motors or when riding upon them.

One of the most notable and encouraging features of coal mining in 1931 was the great reduction in loss of life in explosions of gas or coal dust. Eighty-six deaths from explosions were reported, of which 51 occurred in five explosions classed as major, because each resulted in five or more deaths. The fatality rate from these explosions (both local and major) was 0.20 per million tons, as compared with a rate of 0.49 for the preceding year. The death rate from major explosions alone was 0.12 per million tons, while that for the previous year was 0.40. Thus the death rate from major explosions was reduced about 70 per cent in 1931. Bituminous mines were free from major explosions from Jan. 28 to Nov. 3, a period of nine months and five days, the longest time that bituminous mines have been free from such explosions in the twentieth century.

The largest single major disaster of the year occurred on Jan. 28 in a mine at Dugger, Ind., and resulted in a loss of 28 lives; the second largest disaster resulted in 8 deaths and was caused by an explosion on Jan. 6 in a mine at Beckley, W. Va. Three other explosions caused five deaths each; one of these was in a mine at Midvale, Ohio, on Jan. 3, one at Holden, W. Va., on Nov. 3, and one in an anthracite mine at Mt. Carmel, Pa., on May 29. The explosion at Mt. Carmel was the first major explosion in an anthracite mine in Pennsylvania since May 25, 1928, a period of three years less four days.

One year ago we presented to the readers of *Coal Age* a review of the accident situation in coal mines for the year 1930; I then stated that no figures were available to show how many men were injured, but not killed, by accidents in coal-mining operations. From such incomplete records as were then at hand, it was estimated that non-fatal accidents had resulted in injury to 109,000 men during that year. Since that time, actual reports have been received, and these reports show that 103,821 injuries occurred. If these figures may be used to form an opinion regarding the situation in 1931, we may estimate the number of non-fatal injuries during the year just closed as 76,000. Should this estimate prove to be approximately correct, when actual figures for the year become available, the non-fatal injury rate for 1931 will appear as 174 per million tons, as compared with 193 in the preceding year.

The U. S. Bureau of Mines has been making monthly announcements of progress in the establishment of this new safety record. The score has been carefully kept by the demographical division of the Bureau, organized by and working under the able supervision of W. W. Adams, and now functioning in our Health and Safety Branch. To Mr. Adams and his staff are due full credit for keeping our attention fixed on the sequence of events relating to the safe operation of mines.

Coal-mining accidents that cause injuries of a non-fatal character constitute a promising field for study. It is a lamentable fact that some coal companies do not even keep a record of injuries to their employees, but seem to feel they have performed their full duty, as far as recording such injuries is concerned, when they have sent a report thereof to the state compensation commission. Such companies, fortunately few in number,

*(Turn to page 71)*

# COAL INDUSTRY

## + Building Up Defenses Against Competitive Onslaughts

THE rising tide of competitive fuels, plus unseasonably high temperatures throughout most of the coal burning months and the continued depression in business and industry added still deeper indigo tints to the economic picture in the anthracite and bituminous industries in 1931, but found these industries more willing to fight back with all the means at hand. Merchandising as a weapon in combating oil and natural gas took on added force in 1931, with both operators and sellers relying on advertising to drive home the convenience and economy of coal as a fuel. Combustion service was extended to new consuming sections, and the coal industry manifested an increasing willingness to accept the stoker as a means of retaining domestic markets. Cooperation between solid fuel men and the allied heating and equipment industries took on added importance, and, finally, real attempts were made to secure some measure of stabilization within the bituminous industry.

Production of bituminous coal dropped from 467,526,000 net tons in 1930 to 378,110,000 tons in 1931, according to preliminary estimates by the U. S. Bureau of Mines. The 1931 production was the lowest since 1909, when 379,944,000 tons was mined, and represents a decline of 19.1 per cent from the 1930 total. Anthracite production dropped from 69,385,000 net tons in 1930 to 59,531,000 tons in 1931, a decrease of 9,854,000 tons, or 14.2 per cent.

According to available figures, the greater part of the bituminous loss was due to the decrease in industrial consumption. Railroads, which normally consume about 24 per cent of the output of the country as locomotive fuel, burned only 81,200,000 tons of coal in road train and yard switching service in 1931 (estimated) against 97,857,000 tons in 1930, or a decline of 17.0 per cent. Public utilities, normally taking about 11 per cent of the total output, consumed an estimated total of 38,900,000 tons of bituminous coal in 1931, a decrease of 9.3 per cent from the 1930 total of 42,898,000 tons.

Production of pig iron and ferroalloys, which ordinarily requires about 10 per cent of the annual output, dropped from 31,752,000 gross tons in 1930 to 18,656,000 tons (estimated) in 1931. Coal consumed in the production of pig iron and ferroalloys dropped from 47,300,000 tons in 1930 to 27,800,000 tons in 1931, a decline of 41.3 per cent. Total consumption by these three industries, representing about 45 per cent of the production and 60 per cent of the industrial consumption in normal times, was 188,055,000 tons in 1930 and 147,902,000 tons in 1931, a decrease of 21.3 per cent.

The anthracite industry fared somewhat better than the bituminous industry in 1931, largely due to the fact that the domestic market, which takes more than 70 per cent of the annual output, is not so susceptible to losses due to business depression.

Spot price movements in the bituminous markets of the country indicate that the average realization per ton (in part estimated) dropped 5.8 per cent to $1.65 in 1931, against the *Coal Age* average of $1.75 in 1930. Anthracite spot circular realization, due to a revision of the price structure on April 1, when the unit of sales and quotations was changed from the gross to the net ton, increased slightly in 1931, though the decline in sales in the last four months of the year, the period of highest prices, as well as the loss in values due to increased crushing of unwanted large coal, cut down somewhat the weighted average realization that could have been expected.

The shrinkage in production intensified the bitterness of both inter- and intra-district competition in the bituminous industry in 1931. In this connection, examination of the accompanying table, showing the percentage of the total output mined by each state in 1931 and earlier years, indicates that shifts in tonnage as between states still continue.

Chief evidence of the intensified competition in the bituminous industry lies in the gradual whittling down of prices that characterized 1931. These reductions, made in an attempt to hold markets, were, in turn, largely responsible for cuts in wages in several non-union fields. In connection with the curtailment of working time at most mines, the slices in wage rates materially reduced the earnings of the miners, with the result that the year was marked by several more or less bitter disputes between operators and employees in many of the non-union fields.

Distress among the miners and the competitive conditions facing the operators brought both the public and the bituminous industry to an active consideration of plans for securing some stability of employment, wage scales and prices. In addition, the miners renewed their agitation for federal legislation to regulate the industry. The several proposals for stabilization of the bituminous industry are set forth in the accompanying tabulation, which gives, as far as available information permits, the salient points of each.

As a result of the agitation within and without the industry, representatives of the National Coal Association, after consideration of the proposals offered by the different interests, adopted, on Dec. 3, a plan providing for physical mergers of properties in the different districts.

Recognizing, however, that working out plans for consolidations would require considerable time, the group recommended as a first step the formation of district sales agencies.

Twenty-five separate committees of operators were appointed to carry the story of the plan to the different districts in all parts of the country, and in the succeeding weeks meetings were held in a number of regions to consider individual applications of the plan. Greatest progress was made in this direction in the high-volatile fields of West Virginia, Kentucky, and Tennessee. Representatives of these districts approved the formation of Appalachian Coals, Inc., on Dec. 30, and an application for a charter was filed in Delaware a few days later. At the end of January, 1932, over 20 per cent of the commercial tonnage in the fields in question had agreed in writing to participate and companies controlling another 27 per cent had indicated that they would sign in the near future. The sales agency, however,

## Summary of Major Planks in 1931 Proposals

| Proposal and Sponsor | Production Control | Merchandising |
|---|---|---|
| Chamber of Commerce of the United States. Proposed by Natural Resources Production Committee. | By federal tribunal authorized to permit agreements for the curtailment of production in the natural resource industries, when such overproduction is found injurious to the public interest. | No suggestions. |
| *Coal Age* Program. | Suggests modification of the anti-trust laws to allow agreements among producers on production policies and prices; also sets out measures for some immediate control of output. | Advocates policies and practices based on knowledge of the product and its uses, logical markets, and total costs of production and distribution; and by revision of present price structure and modification of the anti-trust laws to permit price agreements; no coal under such agreements to be sold below cost.. |
| Davis-Kelly bill. Senator Davis and Representative Kelly, Pennsylvania; indorsed by the United Mine Workers. | Provides for bituminous coal commission and licensing of all coal companies shipping in interstate commerce; makes lawful membership in marketing pools and joint selling associations; railroads would be forbidden to make new connections to mines without authority of the commission. | Commission to study problems of export trade and investigate import situation. |
| District sales agency plan. Representatives of the National Coal Association and bituminous operators. | By executive boards of the various district agencies after survey to determine capacity of mines in each district and possible market demand; concerted action between districts is not contemplated. | Coal to be sold through district agencies and designated sub-agents; executive committees to establish classifications, fix prices, gage demand, study distribution expenditures, carry on major advertising through the agencies, cooperate with dealers in the solution of common problems, and supervise shipments to eliminate duplication of selling effort. |
| Governors' conference. Governor Sampson, Kentucky. | Regulation of industry in major producing states east of the Mississippi through exercise of state police power in accordance with a plan drawn up at governors' conference. | No suggestions. |
| Harris plan. Ralph N. Harris, industrial engineer, Morgantown, W. Va. | By trade-wide application of scientific management principles and correlation of production and consumption on a nation-wide scale; average sales volume for years 1925-29 to be used as "market demand" and as key figure to guide managements in rebuilding organizations to secure maximum profits on available business; state and national controlling boards are advocated to oversee operations under plan. | Suggests cooperative marketing and buying by district organizations. |
| Hosford plan. C. F. Hosford, Jr., president, Butler Consolidated Coal Co. | Would limit working time to five days a week; suggests formation of district associations to carry out provisions of program. | By prohibition of the sale of coal below cost; methods of arriving at "cost" outlined. |
| Kentucky plan. P. H. Burlingham, vice-president, Hardy - Burlingham Mining Co. | By decree of governors after survey of possible consumption; regulation of output to be based on determination of theoretical capacity of the various states, districts and mines. | Plan said to provide free market for all grades from all states and districts; excessive prices to be guarded against by increasing district production allotments. |
| Pinchot plan Governor Pinchot, Pennsylvania. | By formation of new competitive field composed of eastern Ohio, Pennsylvania, West Virginia, and eastern Kentucky; regulation to be worked out by governors with advice from the operators. | No suggestions. |
| Wheeling plan Wheeling (W. Va.) bankers and business men. | Urges formation of a new competitive field composed of high-volatile districts in eastern Ohio, western Pennsylvania, and West Virginia —production to be regulated by tribunal to be ultimately selected by operators. | Regulation of prices by tribunal. |

will not attempt to operate pending a Supreme Court decision in an action to determine the legality of the plan, which the U. S. Department of Justice indicated that it would institute.

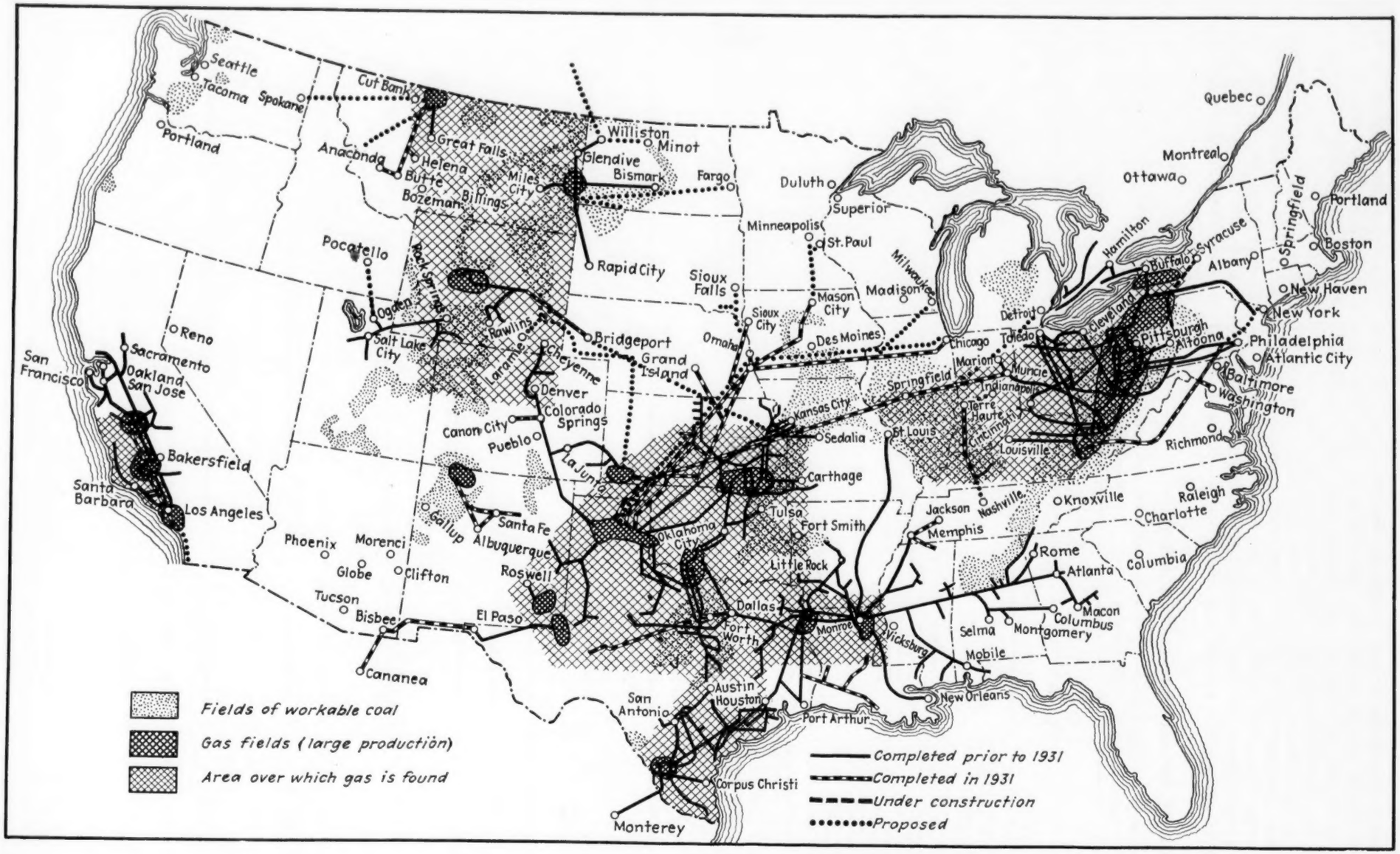
Mergers and sales agencies, however, were not the only principles of stabilization adopted during the year, as a number of operators in several producing districts again embraced the United Mine Workers as a means of ending cut-throat competition based on wage reductions.

Attempts to bring order out of the chaotic credit conditions growing out of the continuing industrial depression and to safeguard the realization of the coal producers by cutting down the losses involved in credit risks resulted in the formation of the National Coal Credit Corporation on June 11.

Fuel oil continued to increase its participation in both the domestic and commercial markets in 1931. Sales of domestic oil burners last year were estimated by the American Oil Burner

## for Stabilizing Bituminous Coal Industry

| Industrial Relations | Mechanization | Research | Consolidations | Safety |
|---|---|---|---|---|
| No suggestions. | No suggestions. | No suggestions. | No suggestions. | No suggestions. |
| *"Unless* some new formula can be found, the conclusion seems inevitable that the desired stabilization of wages and of working conditions must come through a recognition and an acceptance of an outside labor organization by a sufficiently large percentage of the operators to give the wages and the working conditions so established a controlling influence in the districts where direct recognition is withheld." | Fullest possible use of mechanization throughout the industry as a whole advocated to combat competitive fuels. | Urges increased research to find new uses for coal; suggests formation of a corporation to find and exploit new uses. | Suggests mergers between companies within and in different districts, the latter for a national viewpoint; district sales agencies urged as an easier first step. | Urges greater attention to safety and that the industry should insist on better state laws and their more impartial enforcement. |
| Licensees to make and maintain wage and working agreements; miners to be allowed to deal collectively with operators' associations; licenses to be refused to coal companies forbidding men to join union; employees to be free to join union at will, purchase where they choose, and select checkweighmen. | No provisions. | No provisions. | Allows membership in marketing pools and joint selling associations. | No provisions. |
| No suggestions. | No suggestions. | No suggestions. | Especially recommended; district sales agencies advocated as an easier first step. | No suggestions. |
| Final plan to protect interests of labor. | No suggestions. | No suggestions. | No suggestions. | No suggestions. |
| Relations to be governed by state boards. | No definite suggestions; increase in operating efficiency urged. | No suggestions. | Suggested as one means of securing operating and management efficiency. | No suggestions. |
| "Establishment of a minimum wage scale in each district" to wipe out ruinous competition. | No suggestions. | Advocates finding of new uses by individual associations. | No suggestions. | No suggestions. |
| Claims fixing of uniform working time for all districts would result in uniform and equitable wage and working conditions. | No suggestions. | No suggestions. | No suggestions. | No suggestions. |
| No suggestions; to be worked out in final plan. | No suggestions. | No suggestions. | No suggestions. | No suggestions. |
| Regulation of wages by tribunal. | No suggestions. | No suggestions. | No suggestions. | No suggestions. |




**Gas Lines, Installed and Projected, and Gas Fields of the United States Imposed on Map of Workable Coal Areas. (Some of the smaller pipe lines and pipe lines in the congested areas are omitted as of secondary significance.)**

Association, Inc., at 100,000, as compared with 125,000 in the previous year. Consumption of fuel oil (estimated) by domestic burners totaled 35,400,000 bbl. in 1931, as compared with 29,790,000 bbl. in 1930. Installations of commercial burners gained from 39,200 on Jan. 1, 1931, to 42,400 on Jan. 1, 1932, while the consumption of oil by these types of burners rose from 19,600,000 bbl. in 1930 to 21,200,000 bbl. in 1931.

In the industrial field, according to preliminary figures available, the consumption of fuel oil declined, but not to the same extent as coal. Consumption of fuel oil by steam railroads in yard train and switching service (estimated on the basis of figures for eleven months) was 47,467,800 bbl., a decrease of 14.1 per cent from the 1930 total of 55,244,100 bbl. The decrease in coal consumption, as set forth above, was 17.0 per cent. Public utilities used approximately 8,100,000 bbl. of fuel oil in 1931, a decline of 12.5 per cent from the 1930 figure of 9,260,100 bbl. Coal used by public utilities decreased 9.3 per cent last year. Bunker oil supplied to vessels engaged in foreign trade aggregated approximately 43,607,000 bbl. in 1931, a decline of 14.1 per cent from the 1930 total of 50,765,000 bbl. Bunker coal consumption, however, dropped from 3,497,000 net tons in 1930 to 2,228,000 tons in 1931, a decrease of 36.3 per cent. The total decrease in the quantity of industrial oil used for the purposes enumerated above was 14.0 per cent. This compares with a decline of 21.3 per cent in the consumption of coal by railroads, public utilities, and blast furnaces.

Very little data are available upon which could be based a statement as to just where the use of domestic fuel oil made its greatest gains in 1931, but as most of the burners are in Illinois, New York, and the New England states, it seems possible that the greatest advance took place in those sections. In the industrial classification, one of the major losses to oil took place at the bunkering points, where the cheapness of fuel oil was a powerful competitive weapon. As a case in point, fuel oil on the sea has been a competitor of Alabama coal for more than ten years, and is constantly growing in importance. While no separation is made, it is reported that the depression and losses to fuel oil cost Alabama coal producers 300,000 tons in 1931. For industrial oil on land, Alabama reports little loss. Apparently, the major part of the loss to industrial fuel oil on land took place in the Southwest and Rocky Mountain regions, where several railroads converted a number of locomotives from coal burners to oil burners.

More than 5,000 miles of new natural gas lines of major importance were completed in 1931, marking the end of the first phase of a program of expansion which had its inception two or three years ago. The second phase, or consolidation of the market areas, is now under way, and the coming year, it is expected, will reveal to a fuller extent the competition facing both anthracite and bituminous coal. Major completions in 1931 are shown on the map on page 68 of this issue of *Coal Age*. This map also shows proposed lines, which may or may not be built in 1932 and 1933.

Preliminary estimates by the American Gas Association point to a decline of only 2 per cent in the quantity of natural gas used in domestic and commercial heating in 1931, due in large part to the activity in building new lines and extending distribution systems. The decline in industrial consumption, as distinguished from fuel used in producing gas, refining oil, and in the manufacture of carbon black, is estimated by the association at 15 per cent. This compares with an apparent decline of 21.3 per cent in the consumption of bituminous coal for industrial purposes. It appears that one of the major reasons why industrial gas held up so well was the material increase in the consumption of gas in public utility electric plants. Estimating from the eleven months' reports of the U. S. Geological Survey, the total quantity of gas consumed by public utility generating plants in 1931 was 140,800,000,000 cu.ft., an increase of 17.1 per cent over the 1930 figure of 120,289,978,000 cu.ft.

Examination of the situation reveals that natural gas made its comparative gains at the expense of competitive fuels, chiefly coal, and this fact is borne out by reports from several coal-producing and marketing centers. The areas chiefly affected seem to be the South, Southwest, and Rocky Mountain regions, though the effects of natural gas were felt in the Middle West and along the Atlantic seaboard in the latter part of 1931.

Natural gas cost Alabama coal producers an estimated total of 300,000 tons in 1931, according to reports from that state. This loss was divided equally between domestic and industrial coals. The state began to feel the effects of natural gas in Texas five years ago; today, Texas gas is tapping all of the Lone Star market and, in conjunction with gas from Louisiana and Mississippi, has absorbed a large part of the Louisiana market, in addition to becoming a serious factor in Mississippi, west Tennessee, Alabama, Georgia, and northwest Florida. Louisiana gas also is being felt to a limited extent in Arkansas and Missouri. One of the chief developments in the South was the conversion of the power and light company plant at Memphis, Tenn., to natural gas, displacing about 125,000 tons of Alabama or western Kentucky coal a year. Over a period of three years, the total annual Alabama loss to natural gas is estimated to have grown to a total of 2,500,000 tons. Scattered reports from other states serving this market territory indicate that they have suffered proportionate losses.

Completions in the Rocky Mountain states, plus the decline in the percentage of the total coal output of the country, indicate that producers in this region have suffered a loss as great as or greater than Alabama. Natural gas went into at least six large cities in the region in 1931, and not only cut into the coal but also the fuel oil business. Late in 1931, two smelters of the Anaconda Copper Co., at Butte and Anaconda, Mont., were converted from pulverized coal to oil. Normal requirements of these plants are 18,000,000 cu.ft. of gas per day, equivalent to 275,000 tons of coal per year. Also, two smelters at Douglas, Ariz., were converted from oil to gas. In addition to the losses in the region proper, the tonnage moving from the Rocky Mountains to states in the Southwest and Middle West also was affected to some extent, it appears, by the spread of the natural gas network in those sections.

Perhaps the most spectacular construction achievements of the natural gas industry, from the standpoint of the size and length of lines involved, were the completion of the projects from Texas to Chicago, Indiana, and cities in Nebraska and Iowa. Total daily capacity of the lines from Texas to Chicago and Indiana, respectively, is reported to be 300,000,000 cu.ft. If the lines are operated at an average rate of 50 per cent of capacity, said to be the minimum figure if expected profits are to be realized, the total yearly delivery of gas will be equivalent to 2,000,000 tons of bituminous coal. As the introduction of natural

gas means that a much larger volume must be marketed in Chicago, more than 30 per cent of future sales will consist of "interruptable supply," probably in direct competition with coal.

Losses to natural gas in the East probably were somewhat smaller than those in other regions throughout the country, but the completion of the Kentucky-Coatesville line and the consequent introduction of natural gas into Washington and other smaller towns cut into the tonnage of both anthracite and bituminous coal. In addition, other lines built in the eastern part of Pennsylvania also hurt coal, particularly anthracite.

As indicative of the possibilities in future competition of natural gas, the sentiment in some quarters of the gas industry may be examined. Certain gas company officials point to the great increase in attempts to have gas rates lowered as one of the more potent reasons why gas companies are reaching out for more business. Each enforced reduction, they point out, means that the company is forced to a more aggressive development of markets in order to recover in increased volume the profits lost in decreased revenue per unit.

Another school of thought suggests that cooperation between natural gas companies and coal men might be of mutual benefit, and cites the experience of certain sections of the country where threatened raids by outside gas interests resulted in a cooperative division of the possible markets. The gas companies took over those localities where it was manifestly impossible for coal to compete on a fighting basis, while the coal companies, by reducing prices and inducing the railroads to grant concessions in rates, made their hold over other markets impregnable.

Natural gas, by reason of its considerable gains in 1931, was the particular target of educational efforts by both producers and dealers. The latter, as in Chicago and St. Louis, actively used newspaper advertising and personal explanation to acquaint their customers with the economies inherent in the use of coal and also to drive home the fact that equal convenience lay in the use of modern combustion equipment and heat controls. Producers also joined in the campaign, particularly in Alabama and the Rocky Mountain region. Practically all operating and sales companies operating in the Alabama market territory employed sales talks and individual advertising of an educational nature to combat gas in 1931, and a cooperative campaign of newspaper advertising initiated in 1930 was carried over in 1931. Activities in the Rocky Mountain region, and to a lesser extent in other market territories, were largely confined to individual producers and sellers, except in Illinois, where the "Quality Circle" producers embarked on a major radio promotion plan.

Combustion service on the part of coal producing companies took a forward stride in 1931, with the anthracite industry in the van of the movement to increase coal satisfaction through proper application. Through the activities of Anthracite Service, the problems in connection with the application of 800,000 tons of anthracite were ironed out, and a total annual consumption of 230,000 tons was added to the present roll through the presentation of heating facts and values to builders of apartment houses and commercial buildings. Combustion service also showed material gains in the soft-coal producing and selling industries in 1931, reports indicating that a large percentage of the major companies were maintaining staffs of combustion engineers to help industrial users and assist retailers.

A second major educational step was directed toward the improvement of relations between producers, retailers, and members of industries manufacturing or installing heating equipment. These activities centered in the activities of the Committee of Ten—Coal and Heating Industries, which made considerable progress in bringing together the various interests in a cooperative effort to solve mutual problems and thus foster the use of solid fuels by increasing heating satisfaction. Local associations to cooperate with the Committee of Ten were formed in Omaha, Minneapolis, St. Paul, Columbus, Cleveland, Pittsburgh, Baltimore, Charleston, Louisville, Knoxville, and Birmingham.

Anthracite clubs, performing similar duties, were organized in half a dozen Eastern cities. In addition to the activities of the Committee of Ten and the anthracite clubs, the Anthracite Service participated directly in efforts to increase burning satisfaction by instructing coal dealers in 137 cities in combustion methods.

The attitude of coal producers and sellers toward stokers improved materially in 1931. At the end of the year, there were only isolated instances where the coal fraternity failed to interest itself in this equipment, and in the Charleston (W. Va.) area, the Kanawha Coal Operators' Association employed a combustion engineer whose first task is to make a survey of stoker prospects. From reports of

**Percentage of Total Bituminous Production Contributed by Each State in 1931 and Earlier Years**

| | 1923 | | 1925 | | 1927 | | 1928 | | 1929 | | 1930 | | 1931 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Production (1,000 Tons) | Per Cent U.S. Total | Production (1,000 Tons) | Per Cent U.S. Total | Production (1,000 Tons) | Per Cent U.S. Total | Production (1,000 Tons) | Per Cent U.S. Total | Production (1,000 Tons) | Per Cent U.S. Total | Production (1,000 Tons) | Per Cent U.S. Total | Production (1,000 Tons) | Per Cent U.S. Total |
| Alabama | 20,458 | 3.6 | 20,004 | 3.8 | 19,766 | 3.8 | 17,621 | 3.5 | 17,944 | 3.4 | 15,570 | 3.3 | 11,620 | 3.1 |
| Arkansas | 1,297 | 0.2 | 1,220 | 0.2 | 1,549 | 0.3 | 1,661 | 0.3 | 1,695 | 0.3 | 1,533 | 0.3 | 1,238 | 0.3 |
| Colorado | 10,346 | 1.8 | 10,311 | 2.0 | 9,724 | 1.9 | 9,848 | 2.0 | 9,921 | 1.9 | 8,197 | 1.8 | 6,444 | 1.7 |
| Illinois | 79,310 | 14.0 | 66,909 | 12.9 | 46,848 | 9.0 | 55,948 | 11.2 | 60,658 | 11.3 | 53,731 | 11.5 | 44,105 | 11.7 |
| Indiana | 26,229 | 4.6 | 21,225 | 4.1 | 17,936 | 3.5 | 16,379 | 3.3 | 18,344 | 3.4 | 16,490 | 3.5 | 13,310 | 3.5 |
| Iowa | 5,711 | 1.0 | 4,715 | 0.9 | 2,950 | 0.6 | 3,684 | 0.7 | 4,241 | 0.8 | 3,893 | 0.8 | 3,305 | 0.9 |
| Kansas-Missouri | 7,846 | 1.4 | 7,218 | 1.4 | 6,508 | 1.3 | 6,542 | 1.3 | 7,006 | 1.3 | 6,283 | 1.3 | 5,264 | 1.4 |
| Kentucky | 44,777 | 7.9 | 55,069 | 10.6 | 69,124 | 13.3 | 61,860 | 12.4 | 60,463 | 11.3 | 51,209 | 11.0 | 39,890 | 10.5 |
| Maryland | 2,286 | 0.5 | 2,695 | 0.5 | 2,815 | 0.5 | 2,687 | 0.5 | 2,649 | 0.5 | 2,271 | 0.5 | 1,950 | 0.5 |
| Michigan | 1,172 | 0.2 | 808 | 0.2 | 757 | 0.1 | 617 | 0.1 | 805 | 0.2 | 661 | 0.1 | 393 | 0.1 |
| Montana | 3,148 | 0.6 | 3,044 | 0.6 | 3,144 | 0.6 | 3,324 | 0.7 | 3,408 | 0.6 | 3,022 | 0.6 | 2,210 | 0.6 |
| New Mexico | 2,915 | 0.6 | 2,557 | 0.5 | 2,936 | 0.6 | 2,712 | 0.6 | 2,623 | 0.5 | 1,969 | 0.4 | 1,520 | 0.4 |
| North Dakota | 1,385 | 0.2 | 1,325 | 0.3 | 1,528 | 0.3 | 1,650 | 0.3 | 1,862 | 0.3 | 1,700 | 0.4 | 1,610 | 0.4 |
| Ohio | 40,546 | 7.2 | 28,034 | 5.4 | 15,800 | 3.1 | 15,641 | 3.1 | 23,689 | 4.4 | 22,552 | 4.8 | 21,440 | 5.7 |
| Oklahoma | 2,885 | 0.5 | 2,326 | 0.4 | 3,818 | 0.7 | 3,501 | 0.7 | 3,774 | 0.7 | 2,794 | 0.6 | 1,880 | 0.5 |
| Pennsylvania | 171,880 | 30.5 | 136,928 | 26.4 | 132,965 | 25.7 | 131,202 | 26.2 | 143,516 | 26.8 | 124,463 | 26.7 | 97,276 | 25.7 |
| Tennessee | 6,040 | 1.1 | 5,454 | 1.0 | 5,783 | 1.1 | 5,611 | 1.1 | 5,405 | 1.0 | 5,130 | 1.1 | 4,170 | 1.1 |
| Texas | 1,187 | 0.2 | 1,008 | 0.2 | 1,326 | 0.3 | 1,182 | 0.2 | 1,101 | 0.2 | 834 | 0.2 | 850 | 0.2 |
| Utah | 4,720 | 0.8 | 4,690 | 0.9 | 4,781 | 0.9 | 4,843 | 1.0 | 5,161 | 1.0 | 4,258 | 0.9 | 3,330 | 0.9 |
| Virginia | 11,762 | 2.1 | 12,799 | 2.4 | 12,916 | 2.5 | 11,901 | 2.4 | 12,748 | 2.4 | 10,907 | 2.3 | 9,650 | 2.6 |
| Washington | 2,926 | 0.5 | 2,538 | 0.5 | 2,635 | 0.5 | 2,520 | 0.5 | 2,521 | 0.5 | 2,302 | 0.5 | 1,810 | 0.5 |
| West Virginia | 107,900 | 19.1 | 122,381 | 23.5 | 145,122 | 28.0 | 132,952 | 26.5 | 138,519 | 25.9 | 121,473 | 26.1 | 99,769 | 26.4 |
| Wyoming | 7,575 | 1.3 | 6,553 | 1.3 | 6,754 | 1.3 | 6,572 | 1.3 | 6,705 | 1.2 | 6,088 | 1.3 | 5,006 | 1.3 |
| Other states | 262 | 0.1 | 241 | * | 279 | 0.1 | 287 | 0.1 | 231 | 0.1 | 196 | * | 70 | * |
| Total | 564,565 | 100.0 | 520,053 | 100.0 | 517,763 | 100.0 | 500,745 | 100.0 | 534,989 | 100.0 | 467,526 | 100.0 | 378,110 | 100.0 |

* Less than 0.05 per cent.

21 identical companies to the U. S. Bureau of the Census, the total number of stoker installations in residences, apartment houses, and for commercial heating approximated 9,000 in 1931. It is estimated that these 21 companies produce about 50 per cent of the total number sold. In many cases, coal producers and retailers took domestic stoker agencies last year, and made considerable progress in promoting the use of this equipment. Also, the Consolidation Coal Co. and the Pittsburg & Midway Coal Mining Co. undertook to sell the "Firite" industrial stoker.

A further development in the merchandising of stokers was the appearance in several cities of the country of organizations selling complete heat service. Recognizing the advantages of selling a complete and economical combustion service, these organizations offered stokers on a rental or outright purchase basis, and agreed to supply coal as needed, remove ashes, and service the equipment. The methods of charging the customer varied. Some plans provided for a flat monthly payment for service, plus the cost of the coal consumed, while others adopted a scale based on the coal consumed, the service charge being added to the price.

An increasing trend toward the installation of automatic ash-removing equipment was noticeable in stoker design last year. Anthracite stokers, for the most part, were equipped with automatic ash-removal equipment in 1931, and at least three bituminous stokers with this equipment were placed on the market last year.

One of the major developments in the application of equipment to burning coal in domestic service was the action of the Anthracite Institute in placing a seal of approval on such anthracite-burning and heat control equipment as passed tests in the Anthracite Institute laboratory at Primos, Pa. In addition, the institute embarked on an active campaign looking to the cooperative development of new equipment for burning anthracite.

Efforts to make coal more attractive to the home user resulted last year in a heightened interest in chemical treatment to allay dust. Increased interest was manifested by producers, but the growth in activity at the mines was considerably outstripped by the increased employment of chemical treatment at the yards of retail dealers. Smokeless coal from southern West Virginia received the most attention, and this producing region led all the rest in the number of installations of treating equipment.

Two producing companies in the Illinois field went into the chemical treatment of coal last year. One of these organizations ships a boxed nut coated with a paraffin compound, and in addition treats all prepared sizes down to No. 4 nut; reports indicate that the company also is considering the treatment of screenings. Developments in other high-volatile districts of the country consisted largely in the development of existing volume of treated coal by calcium chloride or various patented compounds.

Retailers found trucking of both anthracite and bituminous coal from the mines to near-by cities increasingly irksome in 1931. As a result, individual dealers, local associations, and the National Retail Coal Merchants' Association greatly increased their efforts to curb the practice. Sections hardest hit, according to reports, were Illinois, Pennsylvania, southern New York, Kentucky, Indiana, Ohio, Missouri, Colorado, Oklahoma, and New Mexico.

As evidence of the serious proportions to which trucking can grow, retailers point to the fact that 40 per cent of the coal consumed in Denver, Colo., is trucked in from surrounding lignite mines, and that the tonnage of coal moving into St. Louis, Mo., by truck averages 4,000 per day in mild and 6,000 per day in cold weather.

Dealers relied to a major extent on state or municipal legislation to curb trucking, and individuals and associations in many parts of the country actively campaigned for laws to reduce the practice. Among the cities which passed ordinances of advantage to the retailers were the following: Denver, Colo.; Salt Lake City, Utah; Des Moines, Iowa; Easton, Pa.; and Evansville, Ind. State laws aimed at trucking were passed in Colorado and Kansas, and Indiana passed legislation in 1931 of assistance to dealers.

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## A Record Year in Accident Prevention

(*Continued from page 64*)

are depriving themselves of one of the best instruments to use in preventing accidents to their employees and in acquiring accurate knowledge as to how successful they are in so doing. It is usually found that companies most successful in safeguarding their employees from injury are the companies that keep complete accident records and study them.

Lack of information at this time makes it impossible to state definitely what the ratio of accidents to the number of men employed was in 1931, because we do not as yet know how many men worked in the mines last year. Assuming the same average daily output per employee as that shown by the preceding year's record, the 1,430 fatalities reported in 1931 represent a reduction of 15 per cent in the fatality rate, and the estimate of 76,000 non-fatal injuries represents a reduction of 10 per cent in the injury rate.

It has been stated on previous occasions, and it is well to repeat at this time, that safety to the men employed in mines is measured by the ratio which the number of accidents bears to the number of men employed rather than the number of tons of coal produced. The tonnage per death was, as previously indicated, the best in the history of mining. Thus the life-cost of coal reached a new low level. More significant to the individual miner, however, was the fact that, as far as we can judge at present, the industry also materially lowered the number of accidents in proportion to the number of men employed. Thus the twofold objective of mine-safety work seems to have been accomplished in 1931.

This double accomplishment of the industry, representing, as it does, from the tonnage viewpoint, the best record ever made, and, from the viewpoint of the miner's personal safety, a better record than that of most of the years of the present century, leads one to hope that coal mining will hereafter occupy a new plane of safety; that it will take its rightful place among the industries of the country by functioning with a minimum of accidents that cause suffering to the employees, financial loss to the producers, and unnecessary waste to consumers.

Last year's progress is the strongest evidence of how the miner's safety may be promoted through close cooperation between mining companies and their employees, state mining inspectors, and federal mining officials. The firm basis of cooperation now existing between these agencies is the best assurance of further progress of safety in the future.

# NEW TOPWORKS

## + Construction Holds Up in 1931

DECLINING production and falling prices (in the bituminous industry) failed to halt the anthracite and bituminous producers in their determined efforts to modernize preparation practices and equipment in 1931. While the total capacity of both mechanical-cleaning and hand-picking and screening plants installed or contracted for in 1931 fell below the 1930 figure, data collected by *Coal Age* direct from the field and also through the cooperation of manufacturers of equipment show that the combined drop was less than the decrease in production.

The total capacity of mechanical cleaning plants installed or contracted for in 1931 was in excess of 8,675 net tons per hour. Based on a working day of eight hours and using the government figures of 308 and 303.5 days as the theoretical working years in the bituminous and anthracite industries, respectively, the installed mechanical cleaning capacity in 1931 was 21,045,000 net tons. Actually, the probable capacity is in excess of the figure given, because many operators work their plants more than one shift or shifts of more than eight hours. Moreover, jigs, except installations at bituminous mines, are omitted.

With the 1931 total, the installed mechanical cleaning capacity in the four years during which *Coal Age* has conducted its survey of construction is 97,758,000 net tons.

Total capacity of plants installed in 1931 for handling coal by screening and hand-picking methods was in excess of 19,900 net tons per hour, according to data covering the major part of the building activities collected during the year by *Coal Age*. This total is exclusive of auxiliary coal-handling equipment which does not accomplish a major change in preparation facilities and is, like the mechanical-cleaning capacity, under the added capacity made available.

Pennsylvania — anthracite and bituminous combined—and West Virginia, as in past years, led all other states in the installation of both hand-picking and mechanical-cleaning plants. Pennsylvania, both hard and soft coal, led its neighbor to the south in the capacity of mechanical plants installed, but fell behind West Virginia when bituminous plants alone are considered. The Keystone state, however, maintained a comfortable lead in the installed capacity of plants for hand-picking and screening coal.

Construction in the anthracite field in 1931 was confined to the installation of Chance cones, Hydrotators, and Menzies hydroseparators. Ninety-two of the latter were put

### New Topworks Construction in 1931*

| Coal Company | Plant Location | Capacity, Net Tons Per Hour | Preparation Equipment |
|---|---|---|---|
| Allegheny River Mining Co. | Kittanning, Pa. | 50 | Hydrotator Co.[1] |
| American Coal Co. of Allegany County | McComas, W. Va. | 230 | Link-Belt |
| Argyle Coal Co. | Gallitzin, Pa. | 250 | Heyl & Patterson |
| Arctic Coal & Mining Co. | Youngstown, Mo. | 100 | ..... |
| Bair-Collins Co. | Roundup, Mont. | 250 | Link-Belt |
| Barnes Coal Co. | Barnesboro, Pa. | 500 | Roberts & Schaefer |
| Berger Coal Co. | LeJunior, Ky. | 125 | Morrow |
| Blue Jay Lumber Co. | Blue Jay, W. Va. | 100 | ..... |
| Buckeye Coal & Coke Co. | Devils Fork, W. Va. | 100 | Roberts & Schaefer[2] |
| C.C.B. Smokeless Coal Co. | Glen White, W. Va. | 400 | Fairmont |
| | | 225 | Rheolaveur |
| Carnegie Steel Co. | Clairton, Pa. | 100 | Dorr Co.[3] |
| Central Pocahontas Coal Co. | Anawalt, W. Va. | 180 | American, [4], [5] |
| Clean Eagle Coal Co. | Mallory, W. Va. | 150 | ..... |
| Clear Creek Coal Co. | Clearco, W. Va. | 300 | Fairbanks, Morse |
| Clemens Coal Co. | Minden, Mo. | 400 | McNally-Pittsburg |
| Clinchmore Coal Co. | Clinchmore, Tenn. | 100 | Morrow |
| Clover Fork Coal Co. | Kitts, Ky. | 250 | Roberts & Schaefer |
| Coal Run Mining Co. | Coal Run, Pa. | 300 | Heyl & Patterson |
| | Coal Run, Pa. | 300 | Heyl & Patterson |
| Colonial Colliery Co. | Natalie, Pa. | 50 | Hydrotator Co.[6] |
| Consolidated Coal Co. of St. Louis | Mt. Olive, Ill. | 50 | Link-Belt |
| Consolidation Coal Co. | Owings, W. Va. | 200 | Fairmont |
| | Byrne, W. Va. | 160 | Fairmont |
| Crescent Mining Co. | Peoria, Ill. | 700 | Link-Belt |
| Davis Coal & Coke Co. | Thomas, W. Va. | 150 | Roberts & Schaefer |
| Ebensburg Coal Co. | Colver, Pa. | 400 | Heyl & Patterson |
| Electro-Metallurgical Co. | Alloy, W. Va. | 175 | Kanawha |
| Elk River Coal & Lumber Co. | Widen, W. Va. | 100 | Link-Belt |
| | | 150 | Wilmot[7] |
| Fire Creek Coal Co. | Fire Creek, W. Va. | 125 | Morrow |
| Ford Collieries Co. | Curtisville, Pa. | 200 | Heyl & Patterson |
| | Curtisville, Pa. | 600 | Heyl & Patterson |
| Georges Creek Coal Co. | Hetzel, W. Va. | 200 | Morrow |
| Glen Alden Coal Co. | Wanamie, Pa. | 35 | Hydrotator Co.[6] |
| | Wanamie, Pa. (8) | 200 | Wilmot[2] |
| | Plymouth, Pa. (12) | 300 | Wilmot[2] |
| | Audenreid, Pa. (10) | 250 | Wilmot[2] |
| Green River Fuel Co. | Mogg, Ky. | 100 | Hydrotator Co.[1] |
| Gundlach Coal Co. | Edgemont, Ill. | 100 | Link-Belt |
| Haddock Mining Co. | Silverbrook, Pa. | 250 | Chance |
| Hartford Coal Co. | Hartford, W. Va. | 125 | ..... |
| Harvey Coal & Coke Co. | Harvey, W. Va. | 75 | Fairbanks, Morse |
| Hills Creek Mining Co. | West Blocton, Ala. | 75 | .....[8] |
| Houston Collieries Co. | Keystone, W. Va. | 500 | Link-Belt |
| Hudson Coal Co. | Mayfield, Pa. | 135 | Chance |
| Hume-Sinclair Coal Mining Co. | Hume, Mo. | 300 | United |
| Independent Coal & Coke Co. | Kenilworth, Utah | 1,000 | McNally-Pittsburg |
| Inland Steel Co. | Wheelwright, Ky. | 750 | Link-Belt |
| Imperial Coal Corporation | Coalport, Pa. | 250 | Heyl & Patterson |
| Johnstown Smokeless Coal Co. | Johnstown, Pa. | 175 | Webster |
| Kingston Pocahontas Coal Co. | Springton, W. Va. (3) | 150 | Roberts & Schaefer[2] |
| Koppers Coal Co. | Keystone, W. Va. | 275 | Rheolaveur |
| Lavelle Coal Co. | Mowery, Pa. | 25 | Wilmot[2] |
| Lamar Colliery Co. | Lamar, W. Va. | 200 | Kanawha |
| | Algonquin, W. Va. | 100 | Roberts & Schaefer[2] |
| Lehigh Valley Coal Co. | Lost Creek, Pa. (2) | 70 | Hydrotator Co.[6] |
| | Lost Creek, Pa. (2) | 50 | Wilmot[2] |
| | Wilkes-Barre, Pa. (2) | 70 | Hydrotator Co.[6] |
| | Wilkes-Barre, Pa. (14) | 350 | Wilmot[2] |
| | Centralia, Pa. (2) | 50 | Hydrotator Co.[6] |
| | Hazleton, Pa. (4) | 100 | Wilmot[2] |
| | Mahanoy City, Pa. | 25 | Wilmot[2] |
| | Prospect Colliery (14) | 350 | Wilmot[2] |
| Light Coal Mining Co. | Punxsutawney, Pa. | 200 | Heyl & Patterson |
| Lillybrook Coal Co. | Lillybrook, W. Va. | 300 | Kanawha |
| | Lillybrook, W. Va. | 300 | Morrow |
| Linton-Summit Coal Co. | Terre Haute, Ind. | 250 | McNally-Pittsburg[9] |
| Mallory Coal Co. | Mallory, W. Va. | 50 | Roberts & Schaefer[2] |
| | Landville, W. Va. | 50 | Roberts & Schaefer[2] |

in at various operations during the year, with some companies buying as many as fourteen for one colliery. Eleven Hydrotators were purchased by five different companies for treating the finer sizes. Four companies installed Chance cones in 1931.

In the bituminous fields of Pennsylvania, activity in the installation of mechanical-cleaning equipment was confined primarily to the western part of the commonwealth. Included in the list of mechanical-cleaning plants are the following: Pittsburgh Terminal Coal Corporation, Avella—Chance plant, total capacity, 550 tons per hour, washing capacity, 425 tons; W. J. Rainey, Inc., Uniontown—two installations of American pneumatic separators with capacities of 30 and 150 tons per hour, respectively; Westmoreland Coal Co., Irwin—twin tandem Menzies hydroseparator and screening equipment, capacity, 300 tons per hour; Allegheny River Mining Co., Cadogan—addition to air-sand plant, 50 tons per hour.

Installations of both mechanical-cleaning and hand-picking and screening plants in West Virginia were confined primarily to the southern part of the state. The Menzies hydroseparator proved to be the most popular type of mechanical-cleaning equipment, and nine installations, including two high-capacity single and twin tandem machines, were made by seven companies. The Koppers Coal Co. bought a Rheolaveur plant with a capacity of 275 tons per hour, for its Keystone plant, and the C. C. B. Smokeless Coal Company installed a 175-ton plant at Glen White. Link-Belt-Simon-Carves washers were installed at the Kaymoor operation of the New River & Pocahontas Consolidated Coal & Coke Co. and the Bartley operation of the Pond Creek Pocahontas Co.

Activity in the building of plants for mechanical cleaning in Kentucky was confined to construction of an air-sand plant with a capacity of 100 tons per hour at the Mogg operation of the Green River Fuel Co. Alabama witnessed the first installation of the English Norton washer at the Aldrich mine of the Montevallo Coal Mining Co. Montgomery jig installations were made at the Stith Coal Co., America, and the Republic Steel Corporation, Sayreton.

In Ohio, the Powhatan Mining Co. completed a Chance plant with a washing capacity of 425 tons per hour and a total capacity of 550 tons at Powhatan Point. One mechanical cleaning plant employing Pittsburg-Montgomery jigs was installed at the Atkinson (Ill.) plant of the Midland Electric Coal Co.; capacity, 315 tons per hour. In Indiana, the Linton-Summit Coal Co., Terre Haute, contracted for the erection of a Norton washer with a capacity of 150 tons per hour in a new plant with a total capacity of 250 tons per hour.

Most of the new installations in 1931 are shown in the accompanying table. Where construction included the installation of a cleaning plant, the system is indicated. If more than one cleaning unit was installed, the number is given in parentheses directly after the address of the installation.

This summary of new construction in 1931 was made possible through the cooperation of the following manufacturers of equipment (abbreviations given in the table follow the names in parentheses): Roberts & Schaefer Co. (Roberts & Schaefer); Wilmot Engineering Co. (Wilmot); Hydrotator Co.; Link-Belt Co. (Link-Belt); Webster Mfg. Co. (Webster); H. M. Chance & Co. and The Chance Coal Cleaner (Chance), Montgomery Coal Washing & Mfg. Co. (Montgomery); McNally-Pittsburg Manufacturing Corporation (McNally-Pittsburg); Koppers-Rheolaveur Co. (Rheolaveur); Fairmont Mining Machinery Co. (Fairmont); United Iron Works Co. (United); American Coal Cleaning Corporation (American); Fairbanks, Morse & Co. (Fairbanks, Morse); Dorr Co.; Morrow Mfg. Co. (Morrow); Kanawha Mfg. Co. (Kanawha); the Cumberland Coal Cleaning Corporation (Cumberland); and Heyl & Patterson, Inc. (Heyl & Patterson).

## New Topworks Construction in 1931—*Continued*

| Coal Company | Plant Location | Capacity Net Tons Per Hour | Preparation Equipment |
|---|---|---|---|
| Middle Creek Coal Co | Bickmore, W. Va. | 125 | Morrow |
| Midland Electric Coal Co | Atkinson, Ill. | 315 | McNally-Pittsburg[10] |
| Monitor Coal & Coke Co | Wilkinson, W. Va. | 400 | Link-Belt |
| Montevallo Coal Mining Co | Aldrich, Ala. | 100 | .....[11] |
| Monroe Coal Mining Co | Revloc, Pa. | 100 | Fairmont |
| New River Co | Scarbro, W. Va. | 40 | Fairbanks, Morse |
| New River & Pocahontas Consolidated Coal & Coke Co | Kaymoor, W. Va. | 60 | Link-Belt[12] |
| Northwestern Mining & Exchange Co | Kramer, Pa. | 500 | Heyl & Patterson |
| Pardee-Curtin Lumber Co | Bergoo, W. Va. | 350 | Link-Belt |
| Penn Anthracite Mining Co | Scranton, Pa. | 135 | Chance |
| Pennsylvania Coal & Coke Corporation | Ehrenfeld, Pa. | 450 | Roberts & Schaefer |
| Philadelphia & Reading Coal & Iron Co | Gilberton, Pa. | ... | Heyl & Patterson |
| | | ... | Dorr Co.[13] |
| | | 35 | Hydrotator Co.[6] |
| | Shenandoah, Pa.(2) | 50 | Wilmot[3] |
| Pittsburgh Coal Co | Smithton, Pa. | 300 | Morrow |
| | Houston, Pa. | 400 | Morrow |
| | Sandwich, Ont. | 150 | Morrow |
| Pittsburgh Terminal Coal Corporation | Coverdale, Pa.[14] | 300 | Heyl & Patterson |
| | | 600 | Chance |
| | Avella, Pa.[15] | 550 | Heyl & Patterson |
| | | 425 | Chance |
| Pittston Co | Forest City, Pa.(8) | 200 | Wilmot[3] |
| | Dunmore, Pa.(5) | 125 | Wilmot[3] |
| | Pittston, Pa.(2) | 50 | Wilmot[3] |
| | Throop, Pa. | 25 | Wilmot[3] |
| Pond Creek Pocahontas Co | Bartley, W. Va. | 190 | Roberts & Schaefer[16] |
| | Bartley, W. Va. | 350 | Link-Belt[12] |
| Powhatan Mining Co | Powhatan Point, O.[17] | 300 | Heyl & Patterson |
| | | 425 | Chance |
| Producers Mining Co | Acosta, Pa. | 75 | ..... |
| Pyramid Coal Corporation | Pinckneyville, Ill. | 250 | Link-Belt |
| W. J. Rainey, Inc | Uniontown, Pa. | 30 | American, [4, 5] |
| | Uniontown, Pa. | 150 | American, [4, 5] |
| Repplier Coal Co | Buck Run, Pa. | 20 | Hydrotator Co.[6] |
| Republic Steel Corporation | Sayreton, Ala. | 20 | Montgomery[18] |
| Rochester & Pittsburgh Coal Co | Punxsutawney, Pa. | 300 | Heyl & Patterson |
| | Homer City, Pa. | 400 | Heyl & Patterson |
| | Ernest, Pa. | 300 | Heyl & Patterson |
| | Kent, Pa. | 500 | Heyl & Patterson |
| | Helvetia, Pa. | 500 | Heyl & Patterson |
| Scandia Coal Co | Madrid, Iowa | 150 | Link-Belt |
| Sewanee Coal & Iron Co | Coalmont, Tenn. | 75 | ..... |
| Sonman Shaft Coal Co | Sonman Shaft, Pa. | 250 | Link-Belt |
| Spencer Coal Co | Dunmore, Pa.(3) | 75 | Wilmot[3] |
| Splashdam Coal Corporation | Splashdam, Va. | 100 | Cumberland[19] |
| Stith Coal Co | America, Ala. | 125 | Montgomery[18] |
| Sunshine Coal Co | Centerville, Iowa | 100 | McNally-Pittsburg |
| | Centerville, Iowa | 100 | McNally-Pittsburg |
| Susquehanna Collieries Co | Shenandoah, Pa. | 15 | Hydrotator Co.[6] |
| | Glen Lyon, Pa. | 15 | Hydrotator Co.[6] |
| Temple Coal Co | Jessup, Pa.(3) | 75 | Wilmot[3] |
| | Luzerne, Pa.(2) | 50 | Wilmot[3] |
| Three Forks Coal Co | Cassity, W. Va. | 150 | Fairmont |
| Utilities Elkhorn Coal Co | Boldman, Ky. | 200 | Morrow |
| West End Coal Co | Mocanaqua, Pa. | 250 | Chance |
| Westmoreland Coal Co | Irwin, Pa. | 300 | Roberts & Schaefer[20] |
| Westmoreland Mining Co | Blairsville, Pa. | 500 | Roberts & Schaefer |
| Wheeling Township Coal Mining Co | Adena, Ohio | 150 | Link-Belt |
| Winifrede Collieries Co | Winifrede, W. Va. | 125 | Kanawha |
| Yukon Pocahontas Coal Co | Yukon, W. Va. | 300 | Roberts & Schaefer[20] |

*Also includes new major installations of preparation equipment in existing structures.

[1]Air-sand cleaner. [2]Menzies hydroseparator. [3]Two traction thickeners, 300,000 g.p.h. [4]American pneumatic separators. [5]Dust-collecting system. [6]Hydrotator. [7]Wilmot Simplex jigs. [8]Elmore jigs. [9]Norton washer; capacity, 150 tons per hour. [10]Pittsburg-Montgomery jigs. [11]Norton washer. [12]Link-Belt-Simon-Carves washer. [13]One slurry mixer, 2,100,000 g.p.h.; one traction thickener, 360,000 g.p.h. [14]Total plant capacity, 850 tons per hour. [15]Total plant capacity, 550 tons per hour. [16]Single tandem Menzies hydroseparator. [17]Total capacity, 550 tons per hour. [18]Montgomery jigs. [19]Cumberland cleaner. [20]Twin tandem Menzies hydroseparator.

# COAL SPENDS + Over $750,000,000 in 1931

DECREASED production and further economies in use caused expenditures for materials and supplies by anthracite and bituminous coal mines to drop to $89,900,000 in 1931, against the revised total of $123,000,000 in 1930. These figures exclude all charges to the capital account for permanent improvements and betterments, as well as purchased power, explosives, and wages.

Like the estimate for expenditures for materials and supplies, the estimated totals for purchased power and wages are below those of 1930. Mine workers, it is estimated, received more than $568,000,000 in 1931, against $770,000,000 in 1930, while payments for purchased power aggregated more than $40,000,000, as compared with $42,000,000 in the preceding year. Together with payments for merchandise for resale at company stores, outlays for materials and supplies, purchased power, and wages were sufficient to bring the buying power of the industry up to more than $750,000,000

Data collected by *Coal Age* indicate that the total expenditures for materials and supplies by bituminous producers was over $63,700,000 in 1931. Reduced to a per-ton basis, this averaged 17.0c., against the revised *Coal Age* figure of 18.0c. in 1930, and the preliminary total of 20.0c. per ton determined by the U. S. Bureau of the Census for 1929.

The anthracite industry, according to the survey, spent in 1931 more than $26,000,000 for materials and supplies, against $36,800,000 in 1930. This figure excludes explosives. Expenditures per net ton in 1931 were 44.0c., against 53.0c. in the preceding year. Census figures for 1929 are not yet available for purposes of comparison.

Returns had been received up to the time this issue of *Coal Age* went to press from all but three of the major coal-producing states of the country. In five additional instances they were not sufficiently complete for inclusion in the table. These returns covered both captive and commercial operations, with a preponderance of reports from the latter.

The bituminous estimate of 17.0c. for the country as a whole was arrived at by weighting the totals for each state separately on the basis of actual reports received from operators and the estimated output for each state during the past year. Using the preliminary figures of 378,110,000 net tons for 1931, this weighting gave $63,709,100 as the total expenditures for materials and supplies. Totals for purchased power and wages were arrived at in a similar manner.

Of the returns received which gave data with sufficient detail to make the figures reported available for inclusion in the general compilations, 6.5 per cent were from companies producing less than 10,000 tons in 1931; 18.6 per cent were from companies producing from 10,000 to 50,000 tons; 14.8 per cent from companies producing between 50,000 and 100,000 tons; 18.0 per cent from companies producing between 100,000 and 200,000 tons; 21.3 per cent from companies producing between 200,000 and 500,000 tons; 9.8 per cent from companies producing between 500,000 and 1,000,000 tons; 8.7 per cent from companies producing between 1,000,000 and 2,500,000 tons; and 2.3 per cent from companies producing over 2,500,000 tons per year.

## Expenditures for Materials and Supplies by Coal Mines in 1931

| | 1931 — Estimated Expenditures for Materials and Supplies | | | 1930 — Estimated Expenditures for Materials and Supplies | | |
|---|---|---|---|---|---|---|
| | Production, Net Tons | Average per Ton,* Cents | Total for State** | Production, Net Tons | Average per Ton,* Cents | Total for State** |
| Alabama | 11,620,000 | 14.0 | $1,626,800 | 15,570,000 | 16.5 | $2,569,050 |
| Arkansas | 1,238,000 | 28.0 | 346,640 | † | † | † |
| Colorado | 6,444,000 | 26.0 | 1,675,440 | 8,197,000 | 33.5 | 2,745,995 |
| Illinois | 44,105,000 | 15.5 | 6,836,275 | 53,731,000 | 18.0 | 9,671,580 |
| Indiana | 13,310,000 | 11.5 | 1,896,500 | 16,490,000 | 17.0 | 2,803,300 |
| Iowa | † | † | † | 3,893,000 | 25.0 | 973,250 |
| Kansas | 1,995,000 | 13.0 | 259,350 | 2,430,000 | 11.5 | 279,450 |
| Kentucky | 39,890,000 | 16.5 | 6,581,850 | 51,209,000 | 16.5 | 8,449,485 |
| Maryland | † | † | † | 2,271,000 | 37.0 | 840,270 |
| Missouri | 3,269,000 | 24.5 | 800,905 | † | † | † |
| New Mexico | 1,520,000 | 29.0 | 440,800 | 1,969,000 | 35.0 | 689,150 |
| North Dakota | † | † | † | 1,700,000 | 13.5 | 229,500 |
| Ohio | 21,440,000 | 12.0 | 2,572,800 | 22,552,000 | 16.0 | 3,608,320 |
| Oklahoma | 1,880,000 | 28.0 | 526,400 | † | † | † |
| Pennsylvania | 97,276,000 | 17.5 | 17,023,300 | 124,463,000 | 18.0 | 22,403,340 |
| Tennessee | † | † | † | 5,130,000 | 18.5 | 949,050 |
| Virginia | 9,650,000 | 13.0 | 1,254,500 | 10,907,000 | 11.0 | 1,199,770 |
| Washington | 1,810,000 | 19.5 | 352,950 | 2,302,000 | 22.0 | 506,440 |
| West Virginia | 99,769,000 | 16.0 | 15,963,040 | 121,473,000 | 17.0 | 20,650,410 |
| Wyoming | 5,006,000 | 22.5 | 1,126,350 | 6,088,000 | 40.0 | 2,435,200 |
| Totals for United States | ‡378,110,000 | 17.0 | $63,709,100 | 467,526,000 | 18.0 | $86,266,440 |
| Pennsylvania anthracite | 59,531,000 | 44.0 | $26,193,640 | 69,385,000 | 53.0 | 36,774,050 |

*Averages derived from actual figures submitted to *Coal Age* by operators.
**Production multiplied by average expenditure per ton.
†Included in totals for United States.
‡Including other coal-producing states not specifically shown.

# LETTERS ...to the Editor

## Attacks Editorial Treatment Of District Sales Plan

Those who have investments in the coal industry and are, therefore, most interested in its economic revival, have been engaged for several months, as you are aware, in evolving a practical sales agency plan which they expect at least to be a forerunner of ultimate stabilization. Learned counsel have been consulted and have approved the plan for the formation of these regional sales agencies. In numerous meetings where coal operators have assembled, the plan has been almost unanimously indorsed in principle.

Throughout the country economic journals and the press generally have given encouragement to the plan evolved by the industry to encourage stabilization and eliminate destructive competition through the promotion of orderly marketing and distribution. Probably the outstanding exception is *Coal Age*. Numerous individual operators with whom I have talked have wondered why *Coal Age* has so persistently turned a stream of cold water on a plan that has more nearly met with the unanimous approval of those engaged in the industry than any suggestion made in recent years.

I am not advised whether *Coal Age* has crowned itself as champion of the cause of the coal industry, but there is ample evidence in the wide support given by operators to the regional sales agency plan that its editorial opinion on this subject does not reflect the views of those who operate the coal mines of the Appalachian field. I am sure the rejection of the plan sponsored by *Coal Age* to stabilize the industry does not warrant the reflection of its disappointment in its editorial comment in opposition to the other proposals that the operators believe to have greater merit.

In advocacy of the regional sales agencies, the most ardent proponent has not given expression to the belief that it will solve all the problems of the industry. There is a general belief that it is a step in the right direction. Many believe that upon its success, the solution of other problems of the industry is dependent. It is an elementary proposition that a magic wand cannot be waved over the industry and its problems of production, distribution, marketing, wages, research, freight rates, utilization and substitutes solved overnight. Your journal admits this fact.

If *Coal Age* believes that it represents the coal industry, it is most unfortunate that its pique should be exhibited in tacit hostility to the collective thought of those engaged in the industry. Its announced devotion to the "Business Problems of the Coal Mining Industry" should be sufficient to restrain it from damning with faint praise or undertaking by hostile implications to undermine confidence in a plan that has won such wide approbation among those who have a more substantial interest in the recovery of the industry from its present economic plight.

J. V. SULLIVAN,
Acting Secretary,
West Virginia Coal Association.
*Charleston, W. Va.*

[The district selling agency was one of the many proposals embodied in the comprehensive program for the stabilization of the bituminous coal industry suggested in the September, 1931, issue of *Coal Age*. At that time, in discussing the need for more consolidations, *Coal Age* said: "Undoubtedly mergers of companies within a given district have their place in stabilization. But the immediate outlook in this direction is not bright. . . . District selling agencies probably would be an easier first step than physical mergers of producing companies."

At the suggestion of the president of the National Coal Association, a meeting of directors of that organization with operations east of the Mississippi River was held in New York City, Oct. 21, 1931, "to form a committee to consider stabilization measures." This meeting authorized the creation of a special committee of fourteen to make a study of the situation and report back to the general committee at a later date. The report of that special committee, dated Dec. 2, 1931, after expressing the opinion that the greatest good to the industry would come from physical consolidations, but that it would take considerable time to work out the details of such mergers, stated: "Consequently, as an initial step that may be taken more promptly, the plan is favored of forming regional or district sales agencies."

Obviously, Mr. Sullivan's assumption to the contrary notwithstanding, *Coal Age* could not oppose the district selling agency plan now being fostered by this committee without repudiating the program sponsored in its issue of last September. This program, which represents a study and a synthetization of the industry's own thinking on its problems over a long period of years, sets up major objectives which have received widespread commendation and indorsement from operators—large and small—in every part of the country. *Coal Age* has not the slightest intention of repudiating either the district selling agency plan or any other basic feature of that program at this time.

*Coal Age*, therefore, will continue to support the district selling agency campaign. But it also will continue to insist that there are other steps, equally important, which must be taken before complete stabilization can be achieved. *Coal Age* refuses to believe that the bituminous coal industry is so intellectually bankrupt that it cannot consider two or more ideas simultaneously—specifically, that it cannot push forward its plans for a district selling agency and at the same time give active consideration to those other things which must also be done to establish this great industry on a sound and sane financial and social basis.—THE EDITORS.]

* * *

## For Shorter Working Time

For some time I have been thinking of giving some of my personal opinions relating to our slow but sure decline to a depth where no progress either way can be made. First, let me be a critic of the *Coal Age* methods, which I am sure you won't resent, since I have followed the trail as a reader of its predecessors, the old *Colliery Engineer* and *Metal Miner*. What I want to criticize is the want of the old spirit that dominated *Coal Age* when there were better things said for those who were the main spoke in the industry; namely, the miners.

I am sure you are aware of the degradation and misery thousands are living in, and all that can be said of Russia would make it a paradise beside our system. Why can't some sane plan be adopted to lift the fog from the stinking pool we have sunk into, and why so much about Russia, which at least has a plan to work on and where, if what we read is only true, coal miners are treated at least like humans? Why so much hard-headed bitterness against the six-hour day and five-day week unless it is the wish of certain coal operators to be masters of starving slaves?

Everybody knows there is too much coal being produced for the needs of the country, and all the under-hedge talk of stabilization does not get anywhere. Even *Coal Age* agrees upon reduced production, and nothing seems more simple than the adoption of the six-hour day and short week. Or will they hesitate until it becomes law by Congress, as it is sure to come unless men clean up their own mess brought on by themselves in increasing tonnage at the mines by races and paying bonuses?

*Riverton, Ill.* WM. M. CHAMBERS.

# THE BOSSES TALK IT OVER

## CRIBBING CARS

"Well, here I am, Jim," announced Mac, as he entered the super's office. "The sand boy said you wanted me P.D.Q."

"I want to talk to you about No. 2 motor haul," the super informed Mac. "You know, No. 2 motor puts out about one-third more cars than No. 3; yet No. 3 gets more tonnage. If conditions were different there might be some excuse, but they are not."

"I know, Jim. We have been after the loaders on No. 2 haul to crib their cars, but they say that loading a big car doesn't pay. We can't make them understand that cribbing will give them a dollar or more extra a day."

The super showed heat: "If Slim can get large cars, so can Bill. Tell Bill I will be looking for a new assistant for his section if he doesn't improve this situation. We can't afford to run our motors and cars up and down the entries half loaded."

### WHAT DO YOU THINK?

*1. Does car cribbing pay?*

*2. If so, what is your method of getting cars loaded heavy when payment is by the ton?*

*3. What are your methods if payment is by the car?*

*4. What instructions do you give haulage men on this problem?*

**All superintendents, foremen, electrical and mechanical men are urged to discuss these questions. Acceptable letters will be paid for**

How is discipline best obtained? Jim and Mac considered this problem in January. What the readers think is told in the letters following:

### Discipline Is the Master Key To Mine Safety and Efficiency

Speaking of discipline, which is a byword for safety, it might be well to consider here safety inspections. As often as possible they should be made by the safety engineer accompanied by the mine superintendent or mine foreman. These inspections should not be hurried visits. At least five minutes should be spent with every man, discussing his place, his machine or his work. This five minutes with each man will aid materially in helping to educate in safety. Also, this period will give the safety engineer and whoever accompanies him a closer insight into each man and will make the workers have more confidence in the officials making the inspection, and assure them that the inspectors are fair and have the good of the men at heart. It is also a wonderful opportunity to show the men the value of safety and that the company has an interest in its workers.

The feeling a safety engineer leaves with the men on his visits is of far greater importance than the things he finds. If he leaves the men with the feeling that safety is the best policy and that the company has an interest in them and really wants them to be careful for the sake of their wives and families, the visit has been well worth while. A safety engineer should never hurry through a mine. If he comes to a man and immediately begins to find fault he is tearing down exactly what he had hoped to gain: the man's confidence.

Cooperation may take the form of constructive criticism and thereby dovetail with education. It may take the form of obedience to orders, as with man and boss; it may take the form of mutual aid, as with miner and company and in that form develop the most valuable adjunct to safety, *esprit de corps*. When cooperation reaches this point it is really becoming effective. Often a man will report a thing not because it is particularly dangerous to him or his fellow workers but because it endangers the safety and efficiency of the mine.

Cooperation may take the form of saving of supplies. The man doing this realizes that the more the company saves, the less it has to spend and, in turn, the more it has to pay him.

Discipline is the result of cooperation and education. Men are temperamental machines and must be handled accordingly. To obtain discipline a method must be used that applies to each man individually. Foreman Spencer may walk into Bill Growe's place and order Bill to do so and so. With Bill, it is the order that counts. He couldn't say "Bill, please do so, if you don't mind." for Bill would immediately say to himself, "To Hell with that softie. He ain't got no backbone," and would ignore the request. But an order coming from someone in authority, Bill understands.

Now Jack Meck is an entirely different type. If a direct order were issued to him he would resent it, thinking the foreman was trying to run over him. In Jack's place, the foreman will

say, "Jack, don't you need a post up there?" or "Jack, if it isn't too much trouble, I wish you'd move that rock back, so the machine can get in and cut better." And Jack will do it immediately. M. B. CONNAWAY,

*Thomas, W. Va. Safety Director, Davis Coal & Coke Co.*

## Foremen Make Mistakes, Too

Any mine which has no discipline has no organization. I believe if 100 mine officials were asked what was the principal factor contributing to safety and maximum output at a minimum cost, 99 would immediately answer, "discipline." Wherever there is an absence of discipline, the efforts of an otherwise good foreman are lost. Discipline is the least costly of all safety measures. It is about the only intangible thing about a mine that bears tangible results. It may cause a little friction here and there, but it makes system and safety possible. Eventually it puts money in the pockets of the mine owner, and credit marks on the foreman's record as a mine manager. All orders issued and insisted on, assuming they are reasonable and fair to both employer and employee, lessen future effort to again obtain the same results. Each order allowed to go by default means future disorganization. It may mean death for some and injury for others, or a tightening of compensation rates.

Many accidents result from utter indifference to danger. Regarding Mac and the difficulties he had with Bill, I personally feel Mac showed weakness as a manager of men in many ways. We all have met and had to deal with such men as Bill, and as long as there are mines and mining we will have them to deal with. How much better it would have been if he had sat down and talked things over with Bill. Then if he still felt the reform was hopeless, he should have discharged the man. Bill, though discharged, would have left with a certain amount of respect and good will in his heart for Mac and the action he took.

Never issue an order unless you expect it to be complied with, then see that it is met. I might cite what happened at our mine some time ago: Two of our best men fell out with the night foreman. As Mac says, he jumped all over them and discharged them. The following day they came to me to have their discharge slip signed. Before signing it I had a talk with them to find out the trouble. I learned one of them had lost favor with the foreman for no other reason than because he had addressed him as Buddy when he came into the working place one night, instead of as Mr. Blank. The other man did not know what he had done, but remarked that the foreman had been down in the mouth toward him ever since the night the foreman had approached him for a donation to the church and had been turned down. I did not sign the slip but, instead, put the men to work on the day shift. In the meantime, I investigated their story and found it true. The night man admitted he felt it was the miner's place to address him as Mister, not Buddy. I decided then it was my foreman who needed the talking to. It is true, as I told him, that a man in authority should live a life apart from his men; that is to say, not mingle with them until they reach the point where they do not respect his authority and the position he holds. But at that, he should not feel he is some supreme being among them.

J. T. REYNOLDS.

*Moundsville, W. Va.*

## Something Is Wrong With Mac

I am inclined to think there is something wrong with Mac's methods. Discharge of a good man is not to be laughed off. Did Mac ever stop to think that possibly Bill's way of doing some job may be better than his own? If Mac thought the man was wilfully disobedient he should have called on the super for assistance, sent Bill to the office, and let Jim try to sell him the idea of obedience.

Possibly Bill thinks he knows too much to take orders from Mac. If I thought that, I would certainly keep changing him from one job to another until he went up against something he did not know. Then I would step in and show him that he did not know it all, for, after all, the foreman must be a leader. T. J. LEWIS.

*Ernest, Pa.*

## Here Are a Few Principles For Meting Out Discipline

Discipline, according to the dictionary, means chastisement; to train to obedience or efficiency. Coincident with the operation of a safety organization in a mine comes the question of when and how to discipline. Mine operators have their varied and differing opinions as to what constitutes discipline and what punitive measures, if any, should be taken to deter men from a continuance of violation of rules. These vary all the way from a reprimand for the first offense to discharge for the second; from sending letters to the man's family, to laying him off for a period. There seems to be no set method or organized effort to standardize the punishment given. It is very much like the courts of today, where a man may be given a small fine for the possession of several gallons of liquor and another sent to prison for a year for having a pint. And, as in the case of the courts, it is not the ideal method.

It is a fact too evident that there are very few persons able to reprimand a man, impress upon him firmly just how serious might be the consequences of his infraction, and still not antagonize him. Most reprimands are either nagging or a few short words of the sort found in the vocabulary of the mythical sailor. You can't make a man observe safe practices by constantly telling him that he is a loafer. Impress upon him the fact that he might easily have been seriously injured or even killed by an accident resulting from his misdeed. Send home the point that his family might suffer from his disability. Make him realize that he might have caused the injury or death of some of his coworkers. Point out to him the number of accidents resulting from men having done just what he has done. Make it strong, but at all times keep in mind that you are teaching him something and not punishing him. Telling a child not to play with fire is one thing. Teaching him that if he plays with fire he will be burned and the burn will cause him pain and distress is another.

If the infraction is sufficiently serious to cause the man to be laid off for a period of time, it is too often that the superintendent or disciplining agent just tells him in so many words that he is being laid off for violating Rule 18 Section 10, which deals with fire or some other hazard, and that he may report back to work again within a specified time. Theoretically, that is the panacea for all safety ills. It is a direct punishment. The man loses money because of his carelessness. But, the operators getting the best safety results are those who tell the man just why it has been necessary for the company to lay men off for violating that certain rule or for the continued violation of a rule. They make the man realize that, rather than punishment, they are doing it for his own good and for the good of the other men in the mine or section. When you tell the man he is to be laid off, leave a thought with him that he can ponder over during the time he is off.

It is a sad fact that there are certain occasions when nothing short of discharging a man will correct a flaw in the safety organization's workings. Now, there are many ways of discharging a man. One way is to tell him in no uncertain terms that you wish him to go to the office and get his money and get out and stay out, and that's that. Another way is to tell him that you have given him as many opportunities as is commensurate with the policy of the company and that there is nothing left for you to do but discharge him. Some rare men can discharge employees and make them like it.

It is much easier, of course, to discipline a man when you are angry than when you are in a good humor. But what authority have you to be angry at a man just because you happen to hold a higher position than he? Quick temper? High strung? Those are the two most widely used excuses. A boss has no more right to mete out discipline while in an angry mood than a mother has to whip a child while in the same condition. By losing your temper and cursing men, or discharging them or laying them off, you defeat your own ends. By coolly, rationally reasoning with a man, placing him in your position and impressing him with your reasons for subjecting him to such disciplinary measures, you make him your

confidant. You are educating him in safety. He will return to you a safe worker and he will not be at all backward about spreading the word about the mine as to just how you handled him and what you told him.

When we discipline our men rationally and at the same time educate them along the lines of thought that we must have to maintain a high degree of safety we will be making the greatest single stride toward the elimination of accidents that the coal industry has ever made—discipline, not for chastisement, but to train to obedience or efficiency. C.J.R.

*Alabama.*

## Practice What You Preach

Operating officials, from the inside boss to the general manager, have first to learn to discipline themselves. All men should practice what they preach, whether they are preachers, teachers or mine bosses; our own dereliction from the points we are trying to drive home weakens respect for our teachings or our orders.

Mac's susceptibility to rage, his "jumping all over" and not being able "to figure out" the man who disobeyed him, was a weakness. Had he been a disciplinarian the man would have followed out his ironclad order, and all other instructions if they were at all practicable and to the mutual interest of safety and welfare of the men. Mac's rules should be practical and standardized to the promotion of safety and health and the efficient operation of the mines, and his system of enforcing them sincere, firm and fair. It was perhaps the absence of one or more of these essentials that assisted in lessening the employee's respect for orders. It is probable the instructions were so monotonously routine and insincere, and were only enforced after a brainstorm, or that favoritism and discrimination was generally practiced.

Sometimes, in a group of mines operated by one company, the foreman and often the other officials are responsible for a common breach of discipline, by the encouragement given employees of one mine by the officials of another. The transfer of the man or men in question is sanctioned or refused. If the employee does not receive the transfer he is peeved and becomes more or less careless and indifferent until the transfer is made. Impracticable ideas and practices of officials weaken discipline, although the officials are often enough sincere. Often the inside supervisory officials are not responsible for them, although their lack of sympathy and enthusiasm with the practices in question tends to weaken discipline.

Forced layoffs always were and always will be necessary. They are, of course, a hardship, but they are necessary to obtain discipline. The discharge of an employee is, I think, often unnecessary and ill-advised, except in extreme cases and where one or more enforced layoffs have not accomplished anything. The average employee is amenable to discipline, and the company spending a great deal of time and money training him, cannot afford to discharge him summarily. The money is a total loss if the employee is injudiciously discharged, and it is nearly so if discipline is absent or unwisely and poorly executed. W. H. NOONE.

*Davis, W. Va.*

## Take No Action When Angry

To become a successful mine foreman, a man must first learn how to discipline himself. In my early days in charge of men I frequently lost my temper, but soon found that it did not pay. In overcoming this weakness I found that I had gone a long way toward becoming successful in the handling of men. Almost every man is likely to become angry on occasion, and at times I do, too. But when I am riled up, I never let the heat of my fury interfere with my better judgment; that is, I never take action while in this state, to hire, lay off a man, or make any other decision.

Each man should be made a separate study. I try to be on friendly terms with the men under my charge, but I make it a rule to have no friends when talking business. My men know that, and they know that I will discharge the man who wilfully disregards an order. I give all men a fair chance, but I do not hesitate to discharge them when that action is necessary. J. O. SEESE.

*Sonman, Pa.*

## The Better Man Was Let Out

For many years now—and the cumulative experience of these unexampled times hasn't tended to change this conviction—I have felt that a different attitude toward the coal-mine personnel is urgently needed. Most factory measures are not compatible with mining practice owing to the scattered points of activity and the limitation of human vision, and if one pauses for a minute to analyze, there is truth in the assertion that the big stick is on a par with the outmoded and indefensible competitive tactics which have contributed generously to our present lamentable economic condition. The result of hit-or-miss methods of handling mining labor almost invariably places the bum in the same category with the responsible, upright employee, the realization (in a union camp) coming too late for the management to do anything about it.

In the problem under discussion, Mac should discipline himself before issuing ironclad rules to others. In the first place, an intelligent policy toward Bill and the work to be performed would never have resulted in Bill stepping off the cage before noon, of his own accord. Nor would any occasion have arisen where Mac would be justified in "blowing up" because an order hadn't been carried out. He had a pencil in his pocket and a tongue in his head for better purpose. Brains are where you find them and, from Mac's own confession, the company would be better off were his position reversed with Bill's.

*Panama, Ill.* ALEXANDER BENNETT.

## Discipline Needs Explanation

When a boss sets an example in himself, he adopts the best way to show his men that they will have to live up to and carry out the rules of the mine. Discipline enforcement is not always an easy job. Some workers are of the old school, and therefore their views are hard to change over to the thinking required on new methods of mining and safety. They are inclined to look upon rules that have been established for their protection as regulations which are put on them as a hardship and to make them work harder. It is no use to tell them otherwise when that is so, for they are the men who do the work, and they know. It is better to tell them that the setting of a sprag, the taking down of slate, is more to their benefit than being carried out on a stretcher. If reasoning will not persuade a man to your side, there is nothing left to do but fire him.

A boss who is all nerves and loses control of himself is not the man to be boss of a mine. What if an explosion should occur? Certainly he would be of little use in a case of this kind, where clear thinking is required.

Management's example also has a telling effect on the men. Consider, for one thing, the company's policy regarding the recovery of materials. Suppose the men are required to recover track materials as working places retreat, only to find that the mtaerials which they saved are left to rust in some crosscut. Anyone who thinks the men do not notice those failings in management have another thought coming to them. Not only do the workers note them but they base much of their attitude toward the job on what they have seen. As another example: Perhaps pick stumps are intentionally left behind because the Old Man has no market for the grade of coal the stumps would yield. It is up to the boss to tell the men exactly why he is leaving this coal. Otherwise, the men may think the boss careless and accordingly grow careless themselves.

*Plymouth, Pa.* S. C. HELLER.

## *Trade Literature*

**Cars.** American Car & Foundry Co., New York City. Folder illustrating and describing various mine cars, including rotary dump, skip, etc.

**Belting.** Houghton & Co., Philadelphia, Pa., has issued a 148-page belt treatise entitled "Vim Short-Center Drives," containing charts, tables, and engineering data.

**Couplings.** A 24-page, illustrated bulletin, No. 47, has been issued by the Morse Chain Co., Ithaca, N. Y., describing its flexible couplings.

**Locomotives.** Explosion tested cable-reel locomotives are illustrated and described in Bulletin 529, 15 pp. issued by Jeffrey Mfg. Co., Columbus, Ohio. Included is a table on the haulage capacity of electric mine locomotives.

**Electrical Equipment.** Reliance Electric & Engineering Co., Cleveland, Ohio, in Bulletin No. 210 illustrates and describes Type T two-pole Reliance motors for direct current.

# OPERATING IDEAS

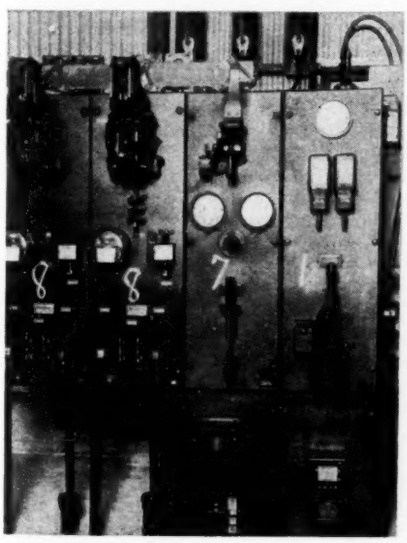
## From Production, Electrical and Mechanical Men

### Numerals Indicate Sequence Of Converter Controls

Any manual operation which requires performing several acts in a definite sequence that is not self-evident should be fitted with tags or labels as a guide to insure correct manipulation. This applies principally to certain operations which are not repeated many times per hour or per day; for instance, the starting of manual or semi-automatic substations. The accompanying illustration shows the sequence numbers on the switchboard in a substation of the Red Jacket Consolidated Coal & Coke Co., Red Jacket, W. Va.

This substation contains one 200-kw. synchronous converter. The control is semi-automatic; that is, the feeder breakers are automatic, but starting of the machine is manual. Although a certain man working in a repair shop near the substation is designated to start the machine in case it trips off, it happens at times that someone not so familiar with the equipment must start it.

**Intervening Numbers Are on Converter and Starting Panel**



In such cases the markings may prevent a starting sequence mistake which would damage the equipment. The controls to be manipulated are marked in their proper sequence as follows: (1) oil-switch; (2) starting position of converter starting switch; (3) converter field switch; (4) running position of converter starting switch; (5) brush lowering mechanism; (6) overload circuit breaker (manual); (7) main knife switch; (8) control switches of two automatic feeder breakers.

This manual control substation was modernized about a year ago, at which time the new automatic breakers were added and the unit was fitted with bearing thermostats, reverse-current relays, and single-phase relays.

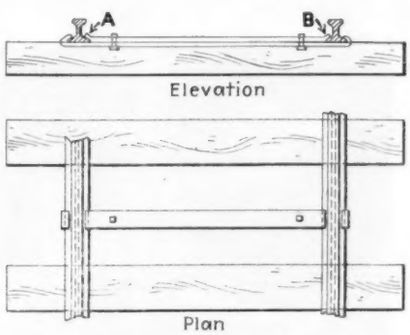
### Scrap Steel Used to Make Bracer Bond

At a certain mine several years ago scrap steel from replaced wooden cars, consisting of drawbars and straps, was utilized advantageously in the making of gage-holding ties or bracers which, because they were welded to the rails, also served the purpose of cross-bonds. In describing the method, Paul W. Hinchee, Beckley, W. Va., writes that these improvised bracers when welded into place gave a connecting area of 2¼ sq.in. and an electrical capacity equivalent to a 4-0 bond.

Prior to this innovation, regular steel ties had been used alternately with wooden ties throughout the mine. These served no other purpose than to maintain the track in gage. It was felt that these ties might be used to better advantage in the work for which they are mainly intended. It was also thought that the new design would serve better than that of the regular tie used in this case.

Details of the design are given in the sketch. When merely bolted together, the two members serve as a bracer only, but when a weld is made at *A* and *B*, the device acts also as a bond. This double utility was taken advantage of only on permanent track. Every third rail length was in this manner cross-bonded and braced, and additional braces were installed wherever needed, mainly at the bottom of swags and on curves. On semi-permanent track the tie was in no instance welded and therefore served merely as a bracer or gage holder.

According to Mr. Hinchee, the results showed a decrease, and profitable use, of




**This Tie Serves a Double Purpose; It Holds the Track to Gage and Acts as a Cross Bond**

the scrap heap; a saving of copper; better maintenance of gage; and more satisfactory employment of the regular steel ties in the service for which they were designed.

### Sand From Crushed Stone Is Dried in Steam Boiler

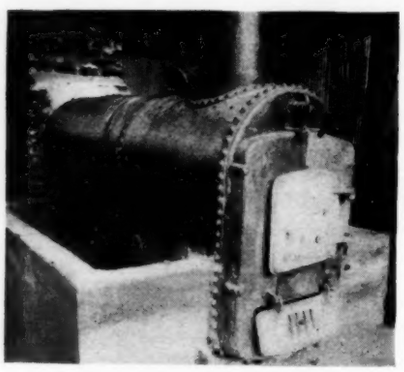
If locomotive sand were to be purchased and shipped in for the new mine of the Southern Collieries, Inc., Coal Creek, Tenn., it would have to be transported up the mountainside to an elevation approximately 1,700 ft. above railroad level. Instead, the supply is made right at the haulage portal by crushing sandstone quarried from a ledge about 80 ft. higher.

An unusual type of sand dryer is used in connection with the installation. This dryer consists of a 20-hp. sawmill boiler which had been discarded as a steam generator. The steam and water

**Sandstone Pulverizer**

space becomes the sand space. A raw sand inlet 6 in. in diameter was cut in the shell just ahead of the steam dome. Holes 2 in. in diameter cut in the bottom of the shell and firebox wrapper sheet allow the dried sand to run out into a concrete hopper, from which it flows by gravity through a short borehole terminating in the haulage entry not far from the mine portal.

According to B. E. Cheely, general manager, a boiler will last many years in this service despite the fact that the



**Sand Is Fed Through Sloping Pipe Back of the Steam Dome**

flues and firebox sheets are not water-cooled. Mr. Cheely installed a dryer of this type some years ago at another mine under his charge.

The pulverizer shed is located on the mountainside above the dryer and about half way between it and the quarry. Both rock and sand are thus conveyed by gravity chutes. The unit, a "Tarvin Type K Pulverizer," made at Maryville, Tenn., was purchased new for the job. Its capacity is 3½ tons per hour and the drive is a 25-hp. motor.

## Grouting a Borehole Casing Pneumatically

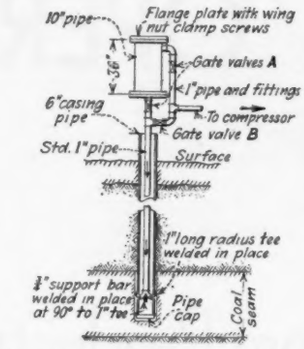
A borehole carrying the cables for underground transmission of power is generally located to penetrate the seam in solid coal. Thus is simplified the job of placing the casing pipe and the subsequent grouting operation, for the job, when tackled in this manner, avoids the flow of water from the hole into the mine before the hole is sealed. But not always will the conditions encountered permit following of all details of the customary procedure, as the experience related below by H. B. Turner, mining engineer, Welch, W. Va., will verify.

During the sinking of a cable borehole an underground stream was hit at a depth of approximately 110 ft. from the surface. It was feared that if the grouting was attempted in the usual manner, the result would not be satisfactory. Perhaps the subterranean stream would militate against a tight grouting seal below. A decision was made, consequently, to force the grouting through a small pipe placed within and lowered with the casing. The general arrangement is illustrated by the sketch.

Standard 1-in. pipe was used for placing the grouting, and 6-in. casing was employed. An extra-heavy long-radius tee, supported by welding, was connected from the small pipe to and through the wall of the casing, the juncture being near the bottom of the hole.

A receiver made of 10-in. pipe was mounted over the hole and connected to the 1-in. pipe. By means of the valves shown, air could be admitted to the drum direct or bypassed to the grouting pipe. During the charging operations valves *A* were closed and valve *B* was opened to maintain constant air pressure on material previously discharged from the 10-in. cylinder. A portable gasoline-driven compressor of the type commonly used on road construction furnished the air.

Neat cement grout was poured into




**With This Piping Arrangement, Grouting Was Poured Pneumatically From the Bottom Up**

the receiver, the top then clamped down, and air turned on at a pressure varying from 80 to 120 lb., as conditions demanded. The grout pipe was then opened and the contents forced down and into the zone of seal through the tee. The grouting was carried on as a continuous operation and until the water forced out at the surface showed a cement discoloration. Grout was then poured in from the top and around the casing to seal the interval above the stream. It is interesting to note that several domestic water wells located more than one-half mile away were dried up following the grouting of the hole.

To complete the job underground, a place was turned from a near-by entry to tap the bottom of the hole. The casing was cut away at the roof line and the small pipe within the casing then hoisted to the surface with the equipment at hand. The results well justified the additional expense incurred, in that a thorough job was done, which by simpler methods might have been unsatisfactory or a complete failure.

## *Ideas Wanted*

**In order to contribute to these pages and receive the reward of $5 or more for each accepted idea, it is not necessary to be a finished writer, nor yet a skilled draftsman. It is the idea that the editors are interested in, and not the composition of the description or the shading of lines in the illustration. Give the editors a clear understanding of the main points of the idea in every-day or on-the-job language, and accompany it by a sketch, in pencil if none other is available, or by a photograph. The editors will do the rest. That's their job.**

## Difficult Paths Transformed By Use of Wood Ties

Numerous examples could be cited of drift mines where for many years the employees going to and from work had to walk up and down a steep, difficult path which at times became dangerous because of mud, snow or ice. At small cost the path could have been improved to ease the walking and practically remove the hazard.

The accompanying illustration shows an improved path such as leads from the railroad up to all mines of the Red Jacket Consolidated Coal & Coke Co., Red Jacket, W. Va. Wood ties set level across the path form a series of steps and short ramps which are easy to climb. Since the ties were installed, which was nearly four years ago, the path has required very little attention. Improving this path was done soon after E. E. Ritter, now vice-president, went to Red Jacket as general manager.

A phase that has not been mentioned

**Made Walking Easy on This Path**

is the advantage of a good path in case a man is injured and has to be carried or helped off the hill. Where neither a car incline nor a vehicle road is situated for convenient use in case of accident, a properly equipped foot path is surely a necessity.

## Scale in Feed Pipes Drilled By Coal Auger

Feed water used at the power plant of the Sharon Coal & Coke Co., Sharondale, Ky., causes no trouble from boiler scale but does drop a deposit which clogs the feed pipes inside the drums. For many years it was the practice to open each boiler every fourth week and install a clean length of 1½-in. down pipe. This was an unpleasant job because there was not time for the boiler to cool completely and a man had to go inside the drum to do the job.

Hammering and punching would not loosen the scale in a pipe that had been removed from the boiler, but it was discovered that weathering on the scrap pile for a few months freed the deposit. A supply of the pipes was kept on hand and each pipe was installed again after the scale loosened.

Not long ago it found that the fresh scale in the pipe could be drilled out; consequently a change in the piping was made which allowed the drilling to be done in place. The elbow at the back end was replaced with a tee and a pipe plug was put in the upper end of the tee, which is located directly below the manhole.

Cleaning the pipe is no longer a disagreeable job and can be done without waiting for the boiler to cool. As soon as the manhole cover can be removed the pipe plug at the top of the tee is removed with a long socket wrench and the sediment in the down pipe drilled out with an ordinary coal auger. Accumulation in the horizontal pipe is slow if the terminal or down pipe is kept reasonably clear. It is the practice to drill the down pipe every fourth week and renew the horizontal pipe about once a year.

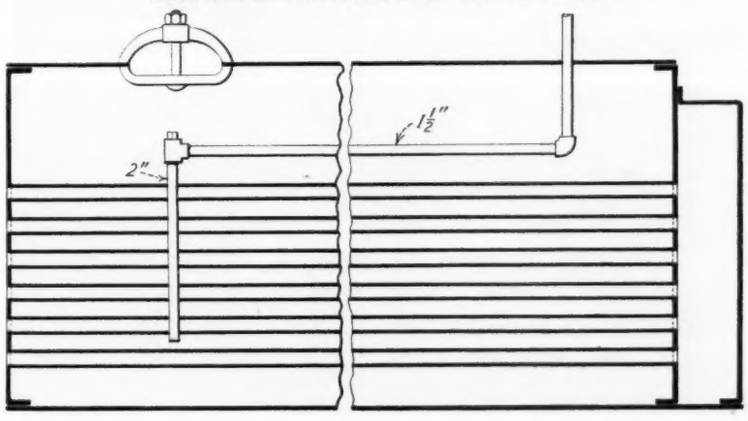
## Anthracite Reserved in Battery Protected by Seal

When the time arrives for drawing pillars in steeply pitching anthracite seams which are worked by batteries, some of the already mined coal held in the batteries as a company reserve for future loading is removed to expose the pillars. That coal is loaded out under the direction and approval of the company. Removal of this coal without authority would be stealing.

For the mining of the pillar coal the men are paid by the car. If there happened to be a fall of roof which blocked the chutes from their places, the pillar men might appropriate some of the company coal from the battery and send it out as their own. Free gloves, tobacco, and other gratuities established cooperation of the driver or motorman. A variation from this form of pilfering was the occasional act of the road cleaners who, desiring an easy shift of it, might fill their cars with company coal and then cover the top with a little ditch mud. Such practices have cost the anthracite producers thousands of tons per year.

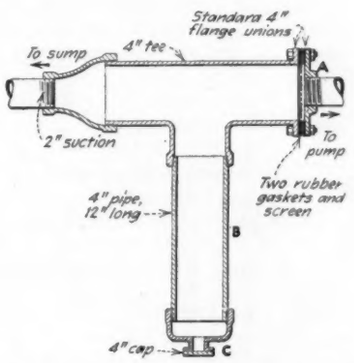
A protection against these losses is suggested by George McDonald, Pottsville, Pa. His idea is simple. It is merely to apply a common lead seal to the chute door. Frequent or even daily inspection of these seals could be made one of the duties of the gas inspectors.

**Feed Line in Horizontal Return Tubular Boiler**




## Trap on Suction End of Pump Keeps Out Trash

Much of the trouble with valves on gathering pumps can be avoided by installing a trap and screen between the sump and the pump itself. This auxiliary will keep out the coal and trash



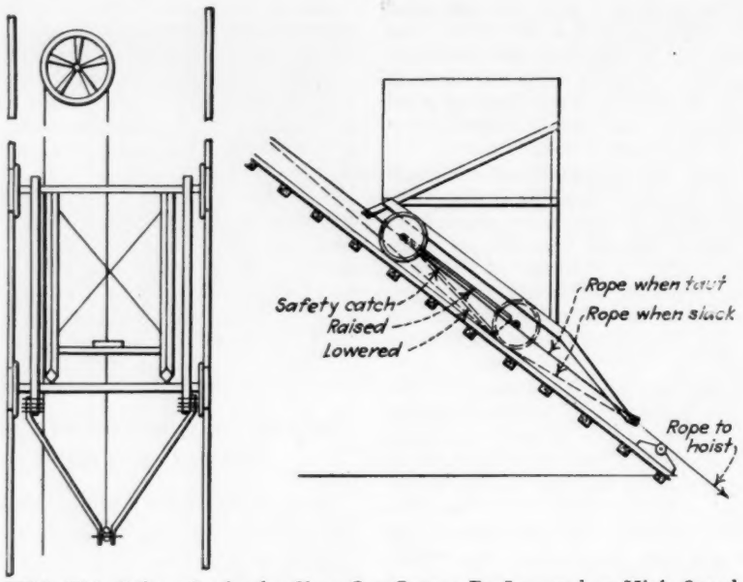

**With This Catch-All, Pump Valves Will Close as They Should**

which on entrance to the pump hold open the valves. Ostel Bullock, Mogg, Ky., describes a trap which can be made in the shop from a standard tee and a few complementary fittings.

The tee should be considerably larger than the line. For a 2-in. suction a 4-in. tee should be used. Referring to the accompanying sketch, at *A* a 4-in. standard flange union with a 4x2-in. reducer is installed. Between these two fittings a wire screen is placed. It is held between two rubber gaskets, the latter being intended to prevent leaking. Section *B* is a 12-in. length of 4-in. pipe which, when joined to the leg of the tee, serves as the catch basin. At the bottom of this pipe, at *C*, a cap is used for the removal of trapped refuse.

## Hoist Rope Operates Safety On Slate Car

When refuse is disposed by car and hoist over a tracked incline, some positive-acting safety arrangement must be provided for stopping or derailing the




**With This Safety Catch, the Slate Car Cannot Be Lowered at High Speed**

car in case the rope should break. The latch turnout, which is so frequently employed for the purpose, is hardly the best solution to the problem, as it wrecks the car. Furthermore, it adds to the difficulty of maintaining track gage and preventing buckling and creeping of the rails. A derailing block, placed on the rail is even less satisfactory.

A safety catch which works on the same principle as the catch of a shaft cage for stopping a slate car is suggested by Lloyd Bush, mine foreman, Inland Collieries Co., Indianola, Pa. As the accompanying sketch shows, the catch, made of 40-lb. rail, is attached to the higher of the two truck axles. It is of such length that when raised it barely clears the lower axle. The catch rides on top of the hoist rope. This rope is attached to the lower end of the car, passes under the car, extends to a sheave at the top of the dump and then down to the hoist at the bottom of the inclined bank. A wood block on the cross-brace of the catch makes contact with the rope. Other details of the mechanism are clearly shown in the sketch.

A feature of this device is that it compels the hoist operatives to lower the car at a safe speed. If the car is lowered at high speed the catch drops and stops the car. Sixty-pound rail is used on the dump, which is inclined 35 deg. The rope is $\frac{7}{8}$-in. in diameter, and the car weighs 5 tons empty and 12 tons filled.

## Shifting Door of Fireboss Board Lights Signals

Something "a little different" in a fireboss board has been put into use at Carswell mine of the Houston Collieries Co. (Koppers interest), Kimball, W. Va. Two views of this board, which is mounted on the outside wall of the lamp house, are shown herewith.

The board consists of two sections, one for each division of the mine. Each section of the board has in front of it a sliding door of half its size, which, when moved to one side or the other, discloses or covers parts of the board indicating respectively whether the fireboss is in the mine or has come out and given his O.K.

Electrical contacts, concealed in the groove above the door, light a green lamp above the "O.K." half of the board when the door bares that portion, and light a red light above the "Danger—Fireboss Inside" part when the door is in the opposite position. Green and red lamps mounted at the man shaft and connected in the same circuits with the lamps above the fireboss board likewise show the "O.K." or "Danger" signals.

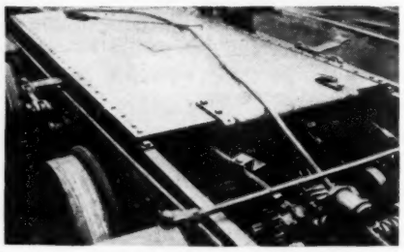
The fireboss is required to fill in only the date, hour, and his name. This he does with chalk. The background of the "O.K." board is green (which appears as a light color in the upper photograph) and that of the "Danger" board is red (black in the lower photograph).

## Insulating Tops Applied to Cable Reel Locomotives

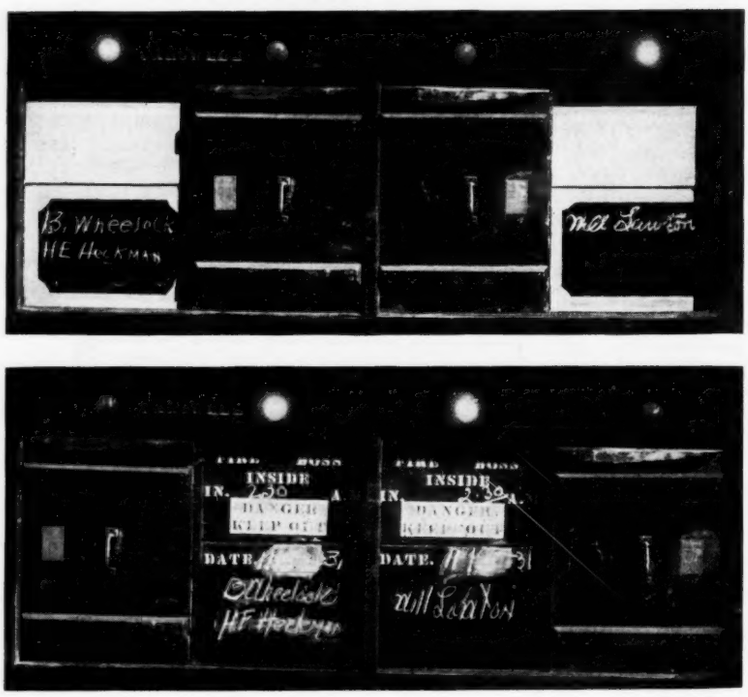
Wood covers are standard for cable-reel gathering locomotives at mines of the Red Jacket Consolidated Coal & Coke Co., Red Jacket, W. Va. This type of material is used as a safety feature to prevent arcing on the cover in case damaged or worn insulation exposes a bare place on the trailing cable.

A locomotive so equipped with wood cover is shown in the accompanying illustration. Oak flooring $\frac{13}{16}$ in. thick is used to make the cover sections. A long wood roller is mounted at the end next to the cable reel.

**Reduces Chance of Cable Arcs**



**Upper—Board Indicating Mine "O.K." Lower—Same Board With Doors Shifted to "Danger"**



# WORD from the FIELD

## New Coal Commission Bill Offered in Congress

Appointment of a federal Bituminous Coal Commission is one of the important provisions in a bill (S.2935) introduced in the Senate on Jan. 12 by James J. Davis, Pennsylvania. The Senate bill corresponds to H.R. 7536, introduced by Representative Kelly, of the same state, and provides that all corporations now engaged in mining and shipping or in shipping coal in interstate commerce must secure a license from the commission to continue operation; that producers and sellers will be permitted to enter into marketing pools or joint selling associations when the commission finds that they are not against the public interest; and that the commission shall hear complaints concerning the reasonableness of the price schedules approved by it. The commission is further charged with the duty of studying the problem of exporting coal, and also must investigate and report to Congress concerning importing of coal.

Companies receiving licenses, according to the terms of the bill, must exert every reasonable effort to make and maintain wage and working agreements and to settle disputes arising under them. Employees shall have the right to deal collectively with the operators in arriving at wage agreements without "interference or coercion exercised by their employers," and no licensee joining a marketing pool or selling association shall make abstention from membership in a labor organization a condition of employment; if any licensee not a member of a pool or association employs only unorganized mine workers, its employees shall be free to join a labor organization at will. Employees also shall have the right of peaceable assemblage, and shall be free to purchase where they choose, and select a checkweighman. Licenses may be revoked in 30 days upon proof of failure or refusal to comply with the terms of the proposed act.

A further proposal of the bill prohibits railroads from building a siding or switch or cutting its lines for such purpose until after it has received the permission of the Interstate Commerce Commission, such permission to be granted only upon approval of the Bituminous Coal Commission.

The Senate Committee on Mines and Mining, on Jan. 29, outlined the procedure in connection with the bill, which is to be submitted to the departments of Labor and Commerce and the Interstate Commerce Commission for opinions. A sub-committee will be named to conduct hearings after replies are received from the above agencies.

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## To Work for Fuel Oil Tariff

Plans for a concerted drive for either a duty or excise tax on fuel oil were laid at a meeting of representatives of the National Coal Association, National Retail Coal Merchants' Association, New York State Coal Merchants' Association, and the Independent Petroleum Association, held at Washington, D. C., Jan. 27. Statements opposing a tariff on fuel oil were released by the Oil Heating Institute in January, and members of Congress received a number of resolutions from farmers' groups in opposition to the proposed duties.

### *Coal Production Off*

Bituminous coal production, hampered by cold weather and the continuing decline in industrial activity, dropped to 27,860,000 net tons in January, according to preliminary figures compiled by the U. S. Bureau of Mines. The output in December, 1931, was 30,260,000 tons, while the total for January of the same year was 38,542,000 tons. Anthracite production is estimated at 3,897,000 net tons in January, against 4,771,000 tons in December, 1931, and 6,157,000 tons in January of the same year.

Consumption of bituminous coal by Class 1 railroads in road train and yard switching service in November, 1931, was 6,283,204 tons, against 7,932,315 tons in the same month in 1930. Consumption by public utility plants in December was 3,107,782 tons, against 3,220,432 tons in November and 3,836,797 tons in January, 1930.

## Change in Lake Cargo Rates Refused by I.C.C.

Present lake cargo rates on coal from mining districts in Ohio, Pennsylvania, Maryland, West Virginia, Kentucky, Virginia, and Tennessee were found to be not unduly prejudicial to Northern producers or unduly preferential of Southern mines in a decision of the Interstate Commerce Commission in Dockets Nos. 23240 and 23241, handed down on Jan. 5. The Commission dismissed the complaints of the Ohio Lake Cargo Coal Rate Committee and the Western Pennsylvania Coal Traffic Bureau assailing present differentials of 35 and 50c. between the Southern high- and low-volatile fields, respectively, and the Northern districts, and requesting that the Commission use its maximum and minimum rate powers, or both, in prescribing non-prejudicial and non-preferential rates for the future.

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## Consolidation Revises Sales

The Consolidation Coal Co., operating six producing divisions in Pennsylvania, Maryland, West Virginia and Kentucky, has revised its sales organization to eliminate the present territorial sales districts. Each of the old districts had its district sales manager and sold all the grades and sizes of coal adapted to the needs of the consumers of the district produced by the company. The territorial groups have been replaced by divisional sales organizations in charge of a sales manager; each of these sales organizations will sell all the grades and sizes of coal produced in a particular mining area.

The six division sales offices of the company will be located near the natural markets of the producing divisions. To simplify and improve executive direction and control, the management staff is being departmentalized. Industrial and dealers' sales will be handled by two departments, with headquarters at New York City, with a director of sales at the head of each. An assistant director of dealer sales will be located in Chicago. The position of general manager of sales is discontinued.

Division sales headquarters will be located in New York (Pennsylvania

division), Chicago (Elkhorn division), Detroit (Pocahontas-New River division), Cincinnati (Millers Creek division), Cleveland (West Virginia division), Baltimore (Maryland division).

"An additional element in our hopes for the success of the reorganization is provided by recent developments within the coal industry itself," declared George J. Anderson, president of the company, in discussing the reorganization. "The potentialities of regional sales agencies have been carefully considered by the officers, directors and counsel of the company. Due to the peculiar corporate structure of the Consolidation Coal Co., to the number and extent of its listed securities, to the complexity of agreements and contracts of such a historic company, actual physical participation in a group of district agreements has been deemed impracticable.

"The new form of sales organization, however, will permit a degree of cooperation in any such forward movements of the industry as would have been almost debarred under its former set-up. We trust, therefore, the new departure will commend itself also to our associates in the industry, along with its other advantages, as an improved channel for mutual relations."

## A.I.M.E. Program Covers Mineral Industries

Mining methods, ventilation, milling methods, gases in metals, iron and steel, non-ferrous metallurgy, engineering education, metals working, coal classification, petroleum engineering and production problems, non-metallic minerals, mining geology, geophysical prospecting, and rare minerals and metals will be discussed at the different technical sessions at the 141st meeting of the American Institute of Mining and Metallurgical Engineers, to be held in New York City, Feb. 15-18.

Papers dealing with coal mining problems are as follows: "Recent Research on the Subsidence of Roof in Coal Mining, Its Pressure, and Strength; A Comparison of Methods Used in the Different European Countries and the United States," George S. Rice, U. S. Bureau of Mines; "Mine Ventilation as It Affects the Health of Miners," R. R. Sayers, U. S. Bureau of Mines; "Pneumonia Fatality and Occupation: A Seven Years' Study of the Pneumonias Encountered by the Medical Services of a Coal and Iron Industry," C. H. Kibbey; "Teaching Management in Engineering Schools," Eugene McAuliffe, Union Pacific Coal Co.; "Classification of Mining Methods," T. T. Read, J. B. Read and R. K. Warner.

"Studies of Soluble Ulmins in Coal" and the "Moisture-Holding Capacity of Coal," Edgar Stansfield and K. C. Gilbart, McGill University; "The Physical and Chemical Properties of Coal in Relation to Classification," H. F. Yancey and K. A. Johnson, U. S. Bureau of Mines; "The Condition of Moisture in Coals of Various Ranks," A. W. Gauger; "Some Physical Properties of West Virginia Coals," Charles E. Lawall, School of Mines, West Virginia University; "Application of Ash Corrections to Analysis of Coals," A. C. Fieldner, W. A. Selvig and F. H. Gibson, U. S. Bureau of Mines; "Properties of Coal Which Affect Its Use in the Ceramic Industries," Wm. E. Rice; "Properties of Coal Which Affect Its Use in the Cement Industry," H. P. Reid; and the "Status of Scientific Classification of American Coals," W. T. Thom, Jr., department of geology, Princeton University. Other papers deal with mining methods and ventilation at metal mines.

### *American Legion Backs Plan To Revive Business*

One more step in the campaign to whip the depression is envisaged in the program of the American Legion to organize the thought of the American people in an effort to work the country out of present business, financial, and industrial difficulties. The first step in the Legion program is the securing of pledges from each of 1,000,000 businesses to employ, upon a given day, a single man in addition to existing personnel, this man to work for six months. A second step is to organize buying "waves" and other ideas utilizing national action with similar timing are in preparation. Local mobilization of effort will be under the direction of the Legion post commanders.

## Ask Subvention in Canada

Western Canadian coal operators have asked the Canadian government for an additional subvention of $1.75 per ton to move 1,000,000 tons of coal per year to Ontario towns, according to reports by representatives of the U. S. Bureau of Foreign and Domestic Commerce. The requested subvention would be in addition to the present grant of ½c. per mile, which the operators state has been offset by the difference in exchange between Canada and the United States and by the practice of the producers in this country of giving rebates, said to amount to $2.80 per ton on coal and coke.

## Virginia Explosion Kills Six

An explosion of gas, believed to have been ignited by a spark, killed six men in the mine of the Pulaski Anthracite Coal Co., Parrott, Va., Jan. 18. About twenty other men in the mine at the same time were uninjured by the blast, which blew out doors and stoppings.

## Norris Anti-Injunction Bill Passed by Committee

The Norris anti-injunction bill received a favorable vote in the Senate Judiciary Committee late in January, and after time is allowed for drafting majority and minority reports, will be reported to the Senate with the recommendation that it be passed. The bill will be reported as amended by the committee; these amendments consisted of minor changes.

## Government Relations Problems Discussed by N.C.A. Group

Opposition to the Davis-Kelly bill for the creation of a federal bituminous coal commission and to the Norris anti-injunction bill were voted at a meeting of the government relations committee of the National Coal Association, which met in New York City, Jan. 29. Charles O'Neill, vice-president, Peale, Peacock & Kerr, Inc., presided. The committee decided to extend its efforts in opposition to the Davis-Kelly and Norris bills by participating in the hearings.

An intensive campaign to secure a tariff on fuel oil was voted at the meeting, and the Goss bill, providing for private operation of Muscle Shoals, was approved. Passage of the Goss bill, which is in line with the efforts of Alabama producers and others in other sections, would, according to opinions, result in the establishment of large chemical industries at Muscle Shoals and eventually result in a new market for about 1,000,000 tons of coal per year.

The committee considered at length future hearings by the Interstate Commerce Commission in the matter of purchase of fuel coal by railroads, and authorized C. E. Bockus, president of the National Coal Association, to communicate with the presidents of the various Class 1 railroads with a view to obtaining suggestions for the guidance of the association in rendering assistance to the carriers. The action on railroad purchases was taken at the suggestion of R. H. Sherwood, chairman, Coal Trade Association of Indiana, who also suggested that a committee be appointed to develop a definite policy that would be fair to the railroads.

## Hanna Consolidates Properties

The Hanna Coal Co. has been consolidated with the Wheeling & Lake Erie Coal Mining Co. and the Bituminous Investment Co. to bring together interests in eastern Ohio. The Wheeling & Lake Erie was the wholly owned operating company of the Hanna organization, and the merger brings the entire sales and producing program under one management. The Bituminous Investment Co. is a real estate company which some years ago acquired a considerable acreage of Ohio coal lands.

# Appalachian Coals Held Up for Legal Test; Districts Consider Selling Plan

OPERATION of Appalachian Coals, Inc., a selling agency formed to handle the coal of producers in eight of the southern high-volatile regions in West Virginia, Kentucky, Virginia, and Tennessee, will be deferred until a decision has been had in the Supreme Court on a test case challenging the legality of the move which the Department of Justice has indicated that it will file. Col. William J. Donovan, New York, former assistant attorney general in charge of anti-trust prosecutions, who a few weeks ago gave his opinion that the district sales agency plan would not contravene the anti-trust laws, will lead the fight for the bituminous operators.

Four hundred operators gathered at Cincinnati, Ohio, Jan. 27, to consider problems in connection with the organization and functioning of Appalachian Coals, and by unanimous vote decided to go ahead with organization plans, in the meanwhile expressing their approval of the government's test case. It was announced at the meeting that operators controlling 32,000,000 tons in the eight fields, or more than 20 per cent of the production, had agreed in writing to participate in the selling company, and that additional producers controlling 27 per cent of the tonnage had indicated that they were willing to sign a contract in the next few days. Word received at the meeting indicated that Southern railroad presidents, Governor Conley, of West Virginia, and a number of bankers, were favorable to the formation of the selling organization.

Inquiry at the Department of Justice develops that officials there appreciate the seriousness of the situation in the bituminous coal industry. They are anxious to cooperate in every possible way in carrying out any plan for aid that is in the public interest and within the law. It was stated that those promoting the regional sales agency plan should proceed on the understanding that they must either obtain legislation permitting the establishment of district sales agencies or that they should be willing to participate in litigation to test the legality of the plan in the courts. It was emphasized at the Department that no reason exists to institute any legal proceedings while the plans of the operators are in a formative state. All that is expected is the institution of a friendly suit in time to prevent the plan from going into actual operation until its legality shall have been judicially examined.

Curiously enough, there has been no anti-trust case that has indicated whether competitors under certain circumstances may cooperate for sales purposes. Some members of Congress are convinced that selling agencies are not illegal unless they control a substantial proportion of the entire output. Others believe that such a plan would conflict with the spirit if not the letter of the anti-trust statutes. They cite the American automobile as a splendid achievement of unbridled competition, wasteful though it may be. In Germany, with its system of limiting competition, automobile development has lagged far behind that in the United States. While they admit great losses resulted in the long fight for the survival of the fittest in the American automobile industry, it was that very condition which resulted in the position of superiority which the American automobile has held for many years. It is admitted that there is a difference between the natural-resource industries and manufacturing industries. In these latter industries the public has an interest above and beyond that of individual ownership. Moreover, in those industries the factors are more obvious. It is possible to see what is going on. In manufacturing, the factors are far more intricate.

Meetings of operators in a number of districts east of the Mississippi were held in January to consider adoption of district selling plans. Northern West Virginia coal men met at Fairmont, Jan. 6, tentatively approved formation of an agency in that district, and appointed a committee to work out a plan for its establishment. This committee later met in New York City and appointed a sub-committee to consider measures brought up by the various interests with the object of making a later report on their feasibility.

Western Kentucky operators met at Madisonville, Jan. 6, and approved the district sales agency plan and appointed a committee to draft a tentative scheme of organization for further discussion. Western Pennsylvania operators met in Pittsburgh on Jan. 7 and approved the plan in principle, directing a committee to work out the details of an organization for that district.

Kanawha operators, at a meeting about the middle of January, expressed a favorable reaction to a district agency. The special committee of fourteen, which recommended to the industry the district selling plan, met in Washington, D. C., to consider progress and problems connected with its adoption in the various districts. Two hundred Smokeless operators met in the same city on Jan. 21 and, reports indicate, informally approved the formation of a district organization and instructed a committee to apply for a charter for a corporation similar to Appalachian Coals. Williamson operators indorsed the plan on Jan. 22, and on the same day producers in the Broad Top field of Pennsylvania appointed a committee to work out a plan for adapting the district agency to their region.

The Pennsylvania committee of five appointed some time ago by Governor Pinchot to draw up a stabilization program for the industry submitted its report in January. Among the recommendations were the following: A study of the taxation of coal companies and coal properties with a view to affording some relief; support of legislation designed to place a tariff on imported crude oil; voluntary consolidations of physical properties along natural lines; use by the Governor of the full power of his office to secure equitable freight rates; stabilization of wages through the formation of district associations of operators; and the appointment by the Secretary of the Department of Mines of a committee to represent the entire industry of the state, to be supplemented or replaced later by a "Pennsylvania bituminous coal committee" formed by the district associations of operators. The report also expressed opposition to compulsory consolidations or governmental control, and declared that the district sales agency plan "marks a step toward unified action by the industry in the solution of one of its vital problems."

The anti-trust laws were the target of a number of bills introduced to Congress in January. Senator Steiwer, Oregon, offered a measure providing for congressional investigation as to the need for amendments to the statutes. Pending the report of the investigating committee, the bill would authorize the partial suspension of the anti-trust laws by permitting agreements between competitors in the natural resource industries for the purposes of regulating production, conserving natural resources, and maintaining continuity and stability of employment, providing such agreements were not contrary to the public interest.

Senator Walsh, Massachusetts, introduced a bill which would authorize the Federal Trade Commission to give advance approval to contracts to curtail production, form mergers, pool sales, or perform other acts to avoid ruinous competition. Such contracts would then be exempt from the operation of the anti-trust laws.

## Grafton Institute Formed

The Grafton Mining Institute, to further safety among the employees of its members, was organized by thirty coal company officials at a meeting at Grafton, W. Va., last month. Officers were chosen as follows: President, W. E. Starford, superintendent, Maryland Coal Co. of West Virginia, Wendel; vice-presidents, L. B. Robinson, chief engineer, Century Coal Co., Century; Scott Wilson, superintendent, West Virginia Coal & Coke Corporation, Norton; N. W. Montgomery, superintendent, Hillman Coal Co., Tunnelton; Charles Dawson, superintendent, Reppert Coal Co., Flemington; and W. E. Brown, superintendent, Renwick Fuel Co., Flemington; secretary-treasurer, G. E. Maze, mining engineer, Maryland Coal Co. of West Virginia, Wendel. The West Virginia Department of Mines cooperated in the formation of the institute, the groundwork for which was laid by John C. Kennedy, safety engineer, National Coal Association.

## Reciprocity in Railroad Buying Attacked by I.C.C. Examiners

Purchases of fuel coal by railroads came in for a large share of attention in the proposed report of Director Wm. P. Bartel and Examiner John L. Rogers of the Interstate Commerce Commission *In the Matter of Reciprocity in Purchasing and Routing*, an investigation instituted by the Commission into railroad buying practices. The investigators charged that traffic considerations exercised a controlling influence in much of the railroad purchasing, and recommended that the provisions of the law giving the shipper the right to specify routing of his traffic be repealed.

Coal purchases, it was pointed out, constituted 21.67 per cent of the total spent by the railroads for material and supplies in 1929. The investigators concluded that the traffic test "is of greater value, weight, and importance than any physical test or analysis" in the selection of railway fuel. "Commercial coal traffic is the basic consideration." Discussing coal prices, the report said:

> The fixing of coal prices is generally conceded to be the perogative of the purchasing department, practices and methods varying on different roads. The most prevalent practice among carriers having mines on their own lines is to call for bids and establish a price range. Other carriers include off-line producers, also sales agencies and brokers, in the invitation to bid. Others call mine operators and producers for price conferences. Others beat the price down to the lowest price that operators will accept and intimate the quantities to be allotted so as to influence prices.
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> Carriers not having producing mines on their lines follow much the same practice, but limit to a great extent the number of bidders and mainly to those in a position to give commercial traffic in return. Foreign line freight charges are also considered in establishing coal prices. Carriers not having mines on line invariably buy coal f.o.b. mines at a lower price than is paid by carriers on whose lines the coal is produced. Witnesses for coal-producing railroads testified that they felt that it was their duty to pay a price to their operators in excess of the price paid by carriers not having mines on their lines in order to keep alive the coal industry on the producing lines. It was frequently stated that they considered railway fuel purchases as the "back log" of the industry. It was noted that this "back log" referred more particularly to joint or competitive mines. . . .
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> Some carriers own mines or control them through subsidiary companies. These mines do not work at capacity for fear that when their coal is exhausted the carrier will be at the mercy of commercial coal producers. In other localities, potential production from carrier mines is used to force commercial mines to make a more favorable price and also to influence greater commercial shipments. Many small concerns are not given opportunities to bid and when protest is made are frankly told that their commercial shipments do not entitle them to any consideration; or if allowed to bid, it is for the purpose of testing the market or for fixing price range and not for the purpose of placing orders. . . . Witnesses generally hesitated to commit themselves as to whether or not the price fixed for coal contemplated or included a "fair profit" to the producer. . . .
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> Instances were shown where the orders passed through the hands of two brokers before they were placed with the purchaser. It is obvious that many firms acting as brokers have so little part in the transactions that their commissions, in reality, amounted to allowances, which may properly be included in the category of rebates.

In numerous instances, according to the report, railroads were given an opportunity to obtain coal at prices less than those generally prevailing, but these often were refused where the potential traffic was small or would interfere with the railroad's policy of distributing orders among producers. Coal of inferior quality or distress coal often was taken by the carriers, the report showed, to hold tonnage, or was forced on them under threat of diversion of business. Also, it was alleged, relatives of prominent shippers and industrialists engaged in the coal business, often as brokers, and brought pressure to bear to secure fuel orders. Mail order houses engaging in the coal business often used traffic as a basis for securing orders, and groups of small operators often formed sales agencies in order to use their combined tonnage as a lever for increased business.

### *Explosives Approved*

Two additions were made to the active list of permissible explosives by the U. S. Bureau of Mines in November and December, as follows:

**Atlas Powder Co., Coalite K, L.F.; volume of poisonous gases, between 53 and 106 liters, inclusive; characteristic ingredient, ammonium nitrate with explosive sensitizer; weight of 1¼x8-in. cartridge, 101 grams; smallest permissible diameter, 1 in.; unit deflective charge, 224 grams; rate of detonation of 1¼-in. cartridge, 9,380 ft. per sec.**

**Austin Powder Co., Austin Red Diamond No. 1, L.F.; volume of poisonous gases, between 53 and 106 liters, inclusive; characteristic ingredient, ammonium nitrate with explosive sensitizer; weight of 1¼x8-in. cartridge, 173 grams; smallest permissible diameter, 1 in.; unit deflective charge, 246 grams; rate of detonation of 1¼-in. diameter cartridge, 10,400 ft. per sec.**

The basic data on one explosive on the active list was changed to the following:

**General Explosives Corporation, Gen-Gel No. 2; volume of poisonous gases, less than 53 liters; characteristic ingredient, nitroglycerin gelatinized with guncotton; weight of 1¼x8-in. cartridge, 217 grams; smallest permissible diameter, 1 in.; unit deflective charge 283 grams; rate of detonation of 1¼-in. diameter cartridge, 9,970 ft. per sec.**

**Cardox, Model B-44, of the Safety Mining Co., was added to the active permissible list of blasting devices in November. Length of shell is 46⅝ in. and the diameter is 1⅜ in., carbon dioxide charge varies from 1 to 1.35 lb.**

## Maryland Coal Aid Group Elects

Brooks Fleming, assistant to the president, Consolidation Coal Co., Fairmont, W. Va., was elected president of the Maryland Coal Aid Association at a meeting last month. Mr. Fleming succeeds the late John S. Brophy. Other officers were chosen as follows: vice-president, Thomas Campbell, president, Campbell Coal Co.; treasurer, Roberdeau Annan, president, Union Mining Co.; executive secretary, William W. Hill, Cumberland, Md.

## Jere Mine to Reopen

The Jere (W. Va.) mine of the Scotts Run Fuel Corporation, which was purchased by the Bank of the Monongahela Valley and the Union Bank & Trust Co. to protect liens, has been leased to the Sunrise Coal Co. The lease runs for five years with option of purchase at the end of the term, and the consideration was $90,000. Plans are under way for immediately reopening the mine, which has a capacity of 1,650 tons per day. Officers of the Sunrise company are: president, Frank C. Shriver; vice-president, I. S. Hershberger; treasurer, Percy J. Beaumont; and secretary, Charles F. Boehler. John Atkinson will be operating superintendent.

## Mines Make Safety Records

The West Kentucky Coal Co. produced 1,889,421 tons of coal in 1931 without a fatality, according to C. F. Richardson, president. Mr. Richardson ascribed the record to continuous attention to safety measures.

United States Fuel Co., operating mines in Utah, had produced more than 1,000,000 tons up to Jan. 16 since the last fatal accident. During 1931, an average of 500 men were employed, producing 500,000 tons with only 27 lost-time accidents involving a loss of 1,765 days, in which was included a total loss of 1,071 days due to four permanent partial disability cases. At the Panther mine, which is on pillar extraction entirely, there has been no fatalities since 1925. The supervisory angle of safety, according to Otto Herres, assistant manager, has been organized around a premium system for bosses, foremen and department heads. Under this system, every accident is charged directly or indirectly to some supervisor, or, from the other angle, a premium is paid for a clean record.

At the first monthly safety meeting of the new year at the Nellis (W. Va.) mine of the American Rolling Mill Co., it was announced by Charles W. Connor, superintendent of mines, that the accident frequency rate in 1931 was still lower than in 1930; the company received a certificate of honor from the Joseph A. Holmes Safety Association for its 1930 record. Beginning with 1926, the frequency rates have been 89.90, 34.50, 27.90, 23.97, 12.65 and 11.43. Severity rates have fluctuated from 0.91 to 19.50. Tons per accident have shown a regular increase to 47,998 in 1931.

## Hartford Starts New Plant

The Hartford Coal Co., Hartford, W. Va., has placed in operation a new mine on the Ohio River with a capacity of 125 tons per hour. The Pittsburgh No. 8 seam is being mined, and a new rail-and-river tipple has been built with a shaker-screen picking table and boom loaders.

# Mine Workers' Convention Argues Policies; Wages Cut in Several Fields

GOVERNMENT regulation of the coal industry, shorter working time, and internal dissension were the chief topics of discussion at the initial sessions of the thirty-second consecutive convention of the United Mine Workers, which opened at Indianapolis, Ind., Jan. 26. The miners went on record as favoring the adoption of the Davis-Kelly bill (summarized elsewhere in these pages) and similar measures providing for the appointment of a federal bituminous coal commission, and voted approval of the six-hour day and the five-day week. Both of these proposals were contained in the report of the international officers.

Criticism of the refusal of the international officers in the 1927-28 strike to allow the negotiation of district agreements and reductions in wages, which were said to have been responsible for the decline of the union, resulted in general disorder and the ejection of John Hindmarsh, Riverton, Ill., from the convention on Jan. 27. Recommendations that the Illinois miners take steps to dissolve the injunction preventing international officers from interfering in the affairs of District 12 precipitated a two-days' debate, though the resolution, which also opposed all use of injunctions in labor disputes, finally was adopted on Jan. 30.

A resolution on unemployment insurance precipitated a hot debate on Feb. 1, many of the delegates asserting that the recommendations were not sufficiently militant. The resolution instructed the officers of the union to seek the cooperation of labor in general in presenting unemployment insurance measures to Congress and the state legislatures, and the principle was voted into the constitution the next day. Heated argument also followed the introduction of a resolution advocating government acquirement of public utilities and all basic industries. Delegates on Feb. 2 came loyally to the support of the present union officers when resolutions requesting them to resign and asking that their supreme judicial, executive, and legislative powers be revoked. A suggestion for reopening the anthracite contract for the insertion of proposals on the equalization of working time was voted down by hard-coal delegates.

Pocahontas operators posted notices of further reductions of 20 per cent in wages last month, following cuts of 10 per cent announced by companies in the Winding Gulf and New River fields. This reduction, it is reported, is a further phase of a cycle of cuts which was initiated by the Pocahontas operators late in 1931. Rates in the New River and Winding Gulf fields after the reduction on Jan. 1, were: machine runners, $4.64 per day; helpers, $4; motormen, $4.16; brakemen, $3.84. Loading rates in the two fields after the Jan. 1 cut were reported to be 35c. per ton.

A reduction, reported to be approximately 10 per cent, was posted at mines in western Kentucky in January. Union coal miners employed by the Pittsburgh Terminal Coal Corporation accepted a reduction of 10 per cent last month. The cut was effective Feb. 1, and the new scale provides the following rates: loaders, 40c. per ton; inside labor, $3.85 to $4.05 per day; outside workers will receive a slightly lower rate.

A number of Hocking Valley (Ohio) producers adopted a new and lower uniform wage scale on Jan. 23, effective Feb. 1. All day men except motormen will receive $3.25 per day, against $3.50 to $4.25; loaders will be paid 38c. instead of the former average of 45c. per ton; and cutters will receive 7c. per ton, as compared with the old rate of 9c. Men employed at eight mines in the region refused to appear for work on Feb. 1. A number of mines did not join in the reduction, and were not affected by the stoppage. These included Mine 255, Ohio Collieries Co., Drydock; Mine 52, New York Coal Co., Tropic; Mine 2, Essex Coal Co., Lost Run; and Mine 219, Buckingham Coal Co., Congo. Announcement was made late in January that the week's strike of H. R. Brown & Son Coal Co. employees at Roswell, Ohio, probably would be settled by arbitration. The stoppage followed a reduction in wages.

Picketing and demonstrations accompanied the progress of the strike called by the National Miners' Union in southeastern Kentucky for reemployment of blacklisted miners, withdrawal of armed forces from the field; release of all miners jailed for union activity; enforcement of the 8-hour day, wage payments in U. S. currency; and wage rates of $4.80 per day for day workers, $4.40 for helpers, and $3.60 for unclassified labor. Arrests for criminal syndicalism were frequent, but the stoppage apparently had little effect on production. The Straight Creek Coal Co., on Jan. 26, secured an order restraining the National Miners' Union and its members from picketing the mines of the company or interfering in other ways with its operation.

William Hightower, president of the Evarts (Ky.) local of the United Mine Workers, was convicted early in January of conspiracy to commit murder as the result of a fatal shooting at Evarts on May 5, 1931, and was sentenced to life imprisonment. Motions for new trials for Hightower and W. B. Jones, previously convicted on a similar charge, were overruled, with the result that appeals will be taken to the Kentucky Court of Appeals.

The Franco No. 1 mine of the Cosgrove-Meehan Coal Co. of Illinois, Johnston City, resumed work on Jan. 11 after the company had acceded to the request of the men for resumption of operations to provide employment. Considerable opposition to the move developed in other sections of the state, union members declaring that the agreement for resumption contained provisions contrary to the union contract. On Jan. 7, 200 miners employed at the Glenridge mine of the Marion County Coal Co., Centralia, Ill., quit when a loading crew of four men were laid off because the working conditions in their place were considered dangerous. The company offered to employ the men elsewhere, but the miners asserted that the agreement provided for seven loading crews, and they refused to work with six.

Six hundred men employed at the W. H. Hughes & Co. mine at Lilly, Pa., were still on strike at the end of the month. The walkout followed the laying off of the night shift a week or so before because of a decrease in demand for coal. The company went into the courts for an order prohibiting the miners from congregating near the mine. An explosion of dynamite, attributed to labor unrest, wrecked the superintendent's house at the Dilltown (Pa.) mine of the Cosgrove-Meehan Coal Co. of Pennsylvania late in the month. The residents were away.

As a result of the wage controversy between the Dominion Steel & Coal Corporation and the Nova Scotia members of the United Mine Workers, the provincial government, late in January, appointed a royal commission, headed by Sir Andrew Rae Duncan, to investigate the coal industry in the province. At the first hearing, held on Jan. 30 at Sydney, the Dominion Steel & Coal Corporation laid before the commission its program for economical operation of its collieries, calling for an average reduction of 12.3 per cent in wages and the closing down of two collieries. Documents were submitted to show that the company's loss was $1,760,069 in 1931, and that the potential competition in the Canadian market had been increased by wage reductions in the United States.

## Anthracite Foresters Elect

H. G. Haupt, land agent for the Lehigh Valley Coal Co., Wilkes-Barre, Pa., was elected president of the Anthracite Forest Protective Association at the annual meeting held in Hazleton, Jan. 13. Other officers were again returned as follows: superintendent, William H. Shearman, general superintendent, New Jersey Zinc Co., Palmerton; secretary-treasurer, J. M. Sloan, Hazleton. E. H. Suender, vice-president, Madeira, Hill & Co., Frackville, and George H. Wirt, chief forest fire warden, Harrisburg, were reelected to the board of directors.

## *Coming Meetings*

American Institute of Mining and Metallurgical Engineers; annual meeting, 29 West 39th St., New York City, Feb. 15-18.

Mine Inspectors' Institute of America; annual meeting, May 9-11, Mallow-Sterling Hotel, Wilkes-Barre, Pa.

## A.M.C. Program Committee Headed by McFadden

George C. McFadden, vice-president, Peabody Coal Co., Chicago, has been selected to head the program committee for the next annual coal convention and exposition of coal-mining machinery to be held at Cincinnati, Ohio, May 2-7, under the auspices of the Manufacturers' Division of the American Mining Congress. Two district meetings of the program committee were held at Pittsburgh, Pa., and Chicago late in January. At these meetings, the following topics were suggested for discussion at the convention: Economics of practical coal mine operation, covering administration problems, mechanization economies, costs and maintenance with mechanical loading, and the realization resulting from thorough cleaning of coal. Nine separate sessions are planned, including one to be devoted to the anthracite industry and another to the position of coal in the industrial life of the country. The final meeting of the committee will be held in February.

## *Committee of Ten Activities*

Plans for issuance of educational bulletins on about fifteen phases of solid fuel heating, a report of a study on the possibilities of silica gel in connection with solid fuels in air conditioning, admittance of the National Association of Power Engineers to advisory membership, and adoption of a resolution recommending that local members of solid fuel industries avail themselves of the engineering facilities of allied organizations, were among the features of the January meeting of the Committee of Ten, held at Cleveland last month in conjunction with the annual convention and biennial exposition of the American Society of Heating and Ventilating Engineers.

Recommendations of the manual committee regarding educational bulletins were approved and following the action it was announced that several would be ready for issuance within the next few weeks. Among the subjects included in the series are: "Chimneys," "Fireplaces," "Certified Heating," "Draft," "Combustion," "Handfiring," "Solid Fuels and Their Individual Characteristics," "Warm Air Heating," "Automatic Heat Controls," "Stokers," "Steam and Hot Water Heating," "Trouble Shooting in the Domestic Plant," "Comparative Data on Solid, Liquid and Gaseous Fuels."

Pittsburgh solid fuel and heating equipment men completed the formal organization of the Better Heating Association of Western Pennsylvania, to cooperate with the Committee of Ten, at a meeting in Pittsburgh, Pa., Jan. 28. John G. Hoffstot, president, Lincoln Gas Coal Co., will represent the producers; C. S. B. Ward, Wieman & Ward, the wholesalers; A. J. Miller, Davis Coal & Coke Co., the coke producers, and R. W. Kiser, Alex Black Coal Co., the retailers.

## *Permissible Plate Issued*

One approval of permissible equipment was issued by the U. S. Bureau of Mines in December as follows:

Chicago Pneumatic Tool Co.; Type 574 post drill; 3½-hp. motor, 250-500 volts, d.c.; Approvals 237 and 237A; Dec. 1.

## Russia Plans Coal Development

The Union of Socialist Soviet Republics will invest 810,000,000 rubles in the re-equipment of old mines and the development of new operations to bring the 1932 coal output up to 90,000,000 tons. Investment in the coal industry in 1931 totaled 587,000,000 rubles, and production was 58,600,000 tons, somewhat short of the goal set in the Five-Year Plan. The program for 1932 calls for an increase in output of 35 per cent, against a 26 per cent increase for last year. Mechanized production in 1932 will aggregate 72 per cent, compared with 61 per cent in 1931. By the expenditure of 283,000,000 rubles for housing, wage increases, and general improvements in living conditions, it is expected that the high labor turnover will be reduced in the coming year.

## *Associations*

F. M. Medaris, general manager, Harvey Coal Corporation, Harveyton, Ky., was elected president of the Hazard Coal Operators' Exchange at the annual meeting held in Lexington, Ky., Jan. 15. Other officers are: vice-president, D. T. Pritchard, manager, Algoma Block Coal Co., Lothair, Ky.; secretary, J. E. Johnson, Lexington; treasurer, Swift Parrish, also of Lexington. The board of directors consists of the following: D. T. Mitchell, Knott Coal Corporation; W. H. Sienknecht, Blue Diamond Coal Co.; E. C. Perkins, Perkins-Bowling Coal Corporation; C. Reginald Ryley, Happy Coal Co.; W. W. Miller, Hatfield-Campbell Creek Coal Co.; A. F. Barbieux, Columbus Mining Co.; and George P. Fitts, Ajax Coal Co.

C. M. Martin, president, Greenville Coal Co., Greenville, Ky., was reelected president of the West Kentucky Coal Bureau at the annual meeting held in Louisville, last month. K. U. Meguire, president, Dawson Daylight Coal Co., Louisville, was again chosen vice-president, and C. E. Reed, of the same city, was reelected secretary. New members of the executive committee are: C. F. Richardson, West Kentucky Coal Co.; C. D. Major, Beaver Dam Coal Co.; R. R. Kirkpatrick, Beech Creek Coal Co.; and Brent Hart, Hart Coal Corporation. Old members continuing on the committee are: A. W. Duncan, W. G. Duncan Coal Co.; Monro B. Lanier, Norton Coal Mining Co.; and Percy D. Berry, Providence Coal Mining Co.

Geo. H. Morse, general superintendent, Republic Steel Corporation, Pittsburgh, Pa., was elected president of the Coal Operators' Association of the Thick Vein Freeport Seam of Pennsylvania at the annual meeting held last month. Other officers were chosen as follows: vice-president, Geo. H. Love, assistant to the president, Union Collieries Co.; secretary, C. W. Gibbs, general manager, Harwick Coal & Coke Co.; and treasurer, J. M. Leithead, all of Pittsburgh. The executive committee is composed of: Geo. W. Gehres, Consumers Mining Co.; M. D. Cooper, Hillman Coal & Coke Co.; L. W. Cooper, Allegheny Pittsburgh Coal Co.; A. R. Pollock, Ford Collieries Co.; and George H. Love.

## *Publications Received*

*Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted.*

**Tests on Timber Pit Props**, by S. M. Dixon and M. A. Hogan. Safety in Mines Research Board. Paper No. 72; 81 pp., illustrated. Price, 2s. Results of series of tests covering a period of five years in the laboratories of the Civil Engineering Department of the Imperial College of Science and Technology, on behalf of the Support of Workings in Mines Committee of the Safety in Mines Research Board. H. M. Stationery Office, Adastral House, Kingsway, London, W.C. 2, England.

**Tests on Brick Kilns Fired With a Stoker**, by W. E. Rice and R. R. Faller. Bureau of Mines, Washington, D. C. R. I. 3,122; 20 pp., illustrated. Preliminary report giving test data to illustrate results and show the reasons for successes and failures of the method of firing investigated.

Coke and By-Products in 1929, by F. G. Tryon and H. L. Bennit. Bureau of Mines, Washington, D. C. Price, 20c. 102 pp.

A Novel Method of Ventilating a Pennsylvania Coal Mine, by C. W. Owings. Bureau of Mines, Washington, D. C. R. I. 3,127; 7 pp. Describes simplified system of ventilation at a mine of the Crucible Fuel Co.

Fatalities in Tennessee Coal Mines, by H. B. Humphrey and F. E. Cash. Bureau of Mines, Washington, D. C. I. C. 6,517; 13 pp.

How and Why Fatalities Occurred in Pennsylvania Bituminous Coal Mines During the Five-Year Period, 1926-1930, by W. J. Fene. Bureau of Mines, Washington, D. C. I. C. 6,505; 25 pp.

1931 Supplement to Book of A.S.T.M. Standards. American Society for Testing Materials, Philadelphia, Pa. Pp. 144, illustrated. Price, $1.50.

## M. W. Bush Dies

Morris William Bush, president of the Alabama By-Products Corporation, died of a heart attack at his home in Birmingham, Ala., Jan. 24. Mr. Bush, who was 52, was graduated from Vanderbilt University in 1899 and in the same year accepted a minor position with the Alabama Consolidated Coal & Iron Co. In 1907, he was made superintendent of the plants of the Woodward Iron Co., in which capacity he served seven years, then becoming president of the Shelby Iron Co., Imperial Coal & Coke Co., and Coosa Pipe & Foundry Co. He was elected president of the Majestic Coal Co. in 1916, and this company was then consolidated with the Imperial Coal Co. and the Birmingham Coke & By-Products Co. in 1918, under the name of the Alabama By-Products Corporation. The extensive holdings of the Pratt Consolidated Fuel & Iron Co. were acquired in 1925. In addition to his coal connections, Mr. Bush was identified with banking, business, and industrial development in Birmingham and the South.

The Late M. W. Bush

## *Obituary*

J. Elias Fries, 55, chief engineer of the Tennessee Coal, Iron & Railroad Co. for fifteen years, died at his home in Birmingham, Ala., Jan. 23.

Nathaniel Mosbey, 45, foreman at the Kingston Station mine of the Princeton Mining Co., Princeton, Ind., died Jan. 7 as the result of injuries received when struck by a runaway car. Mr. Mosbey was formerly superintendent at the Francisco mine of the Francisco Coal Co.

James C. Watson, president, Mastellor Coal Co., died at his home in Keyser, W. Va., last month, after ill health had forced his retirement from active participation in the company last October.

Warren A. Wilbur, 72, president of the Jefferson Coal Co., died Jan. 15 at his home in Bethlehem, Pa.

John Marland, 61, general superintendent of the King-Harlan Coal Co., died at Cincinnati, Ohio, Jan. 29, of appendicitis.

Robert P. Maloney, assistant general manager of the coal operations of the Dominion Steel & Coal Corporation, Glace Bay, N. S., and president of the Penker Coal Mining Co., Portage, Pa., died suddenly in New York City, Jan. 31, after suffering a heart attack. Mr. Maloney at the time was returning from Pennsylvania to Nova Scotia. He first started in coal mining as a trapper, and worked his way up in the industry in northern West Virginia, Maryland, and Pennsylvania. In addition to the above, Mr. Maloney at one time held executive positions with the Rochester & Pittsburgh Coal & Iron Co. as assistant general manager; and with the Lindsey Coal Mining Co. and the Davis Coal & Coke Co. as vice-president.

## *Personal Notes*

James F. Crockett, who resigned as West Virginia state mine inspector a short time ago, has been appointed manager of the mines of the National Fuel Co., National, W. Va. Mr. Crockett was in charge of the Connellsville By-Product Coal Co. mine on Scotts Run before going on the inspection staff.

Harry G. Kennedy, graduate mining engineer, lately connected with the Carbon Fuel Co. and the Wyatt Coal Sales Co., Cincinnati, Ohio, has been appointed combustion engineer for the Kanawha Coal Operators' Association, Charleston, W. Va. Mr. Kennedy will handle the field work in connection with the activities of the newly-formed Kanawha Coal Utilization Institute, with particular reference to replacing natural gas with coal in Charleston and vicinity.

A. C. Field, for eight years engaged by various credit associations and a student of coal credit problems, has been appointed field secretary of the National Coal Credit Corporation, with headquarters in Cincinnati, Ohio.

S. B. Johnson has been elected vice-chairman of the Lorain Coal & Dock Co., Columbus, Ohio. He is succeeded as vice-president in charge of operations by A. C. Saunders, Jr. Roy C. Gilbert has been elected vice-president in charge of sales, and Charles G. Johnson has been chosen general superintendent, taking over the duties of James W. Johnson, general manager, resigned, and George W. Wyss, assistant general manager, deceased.

## *Industrial Notes*

George H. Bucher, formerly assistant general manager, has been elected vice-president and general manager of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. Bucher joined the Westinghouse organization in 1909.

William E. Umstattd, a member of the Timken organization for thirteen years and for the past two years factory manager, has been made executive vice-president of the Timken Roller Bearing Co., Canton, Ohio. Henry H. Timken, for two years assistant works manager, has been made assistant to the president of the Timken company.

Electric Storage Battery Co., Philadelphia, Pa., has opened new headquarters for the Cleveland (Ohio) sales and engineering staff at 600 Herman Ave. N.W. The new headquarters also will include the Cleveland battery assembling plant. H. F. Sauer is manager.

Sheldon Smillie, formerly with the Car Dumper & Equipment Co. and the Roberts & Schaefer Co., will represent the Fairmont Mining Machinery Co. in the Pennsylvania and eastern Ohio fields after Feb. 15, with headquarters in Pittsburgh, Pa.

L. W. Grothaus, assistant manager of the electrical department, has been appointed general representative of the Allis-Chalmers Mfg. Co., Milwaukee, Wis., vice Clarence E. Searle, resigned. Mr. Grothaus became affiliated with the Allis-Chalmers organization in 1904 with the acquisition of the Bullock Electric Mfg. Co.

M. I. Dorfan, formerly manager of the dust-collector division of the Pangborn Corporation, Hagerstown, Md., has been appointed manager of the dust-collector division of the Blaw-Knox Co., Pittsburgh, Pa.

Reliance Electric & Engineering Co., Cleveland, Ohio, has removed its Cincinnati (Ohio) office, with J. L. Van Nort in charge, to 2905 Carew Tower. H. A. Holmes has been added to the Toledo (Ohio) sales staff and L. M. Dunning has been transferred to the office in Cleveland, Ohio.

Mining Safety Device Co., Bowerston, Ohio, has appointed J. A. Malady, Pittsburgh, Pa., as sales representative in western Pennsylvania, Maryland, and northern West Virginia.

R. M. Patrick, 4271 Washington Boulevard, has been appointed St. Louis (Mo.) district manager for the Atlas Car & Mfg. Co., Cleveland, Ohio.

Babcock & Wilcox Co., New York City, announces that the sales offices of the Babcock & Wilcox Co. and the Fuller Lehigh organizations have been consolidated and that all business heretofore carried on separately or jointly by these companies will be done in the name of the Babcock & Wilcox Co. through its district sales offices.

Henry H. Peck, formerly with the Standard Steel Works Co., Burnham, Pa., has joined Lukenweld, Inc., Coatesville, Pa., as manager of sales. Mr. Peck succeeds John S. Bleecker, who has been appointed manager of sales research and advertising for the Lukens Steel Co. and its divisions.

# Coal Mine Fatalities Decrease in December; 1931 Fatality Record Best in History

ACCIDENTS in the coal mines of the United States in December, 1931, resulted in the death of 93 men, according to information received from state mine inspectors by the U. S. Bureau of Mines, which is a reduction of 33 fatalities from the number reported in December a year ago and 10 less than the number reported for November, 1931. Production of coal in December was 34,931,000 tons, a decrease of 11,341,000 tons from the output in December, 1930, but an increase of 680,000 tons over November, 1931. The death rate per million tons of coal, based on these figures, was 2.67 for December; 3.01 for November; and 2.72 for December, 1930.

For bituminous mines alone, the death rate in December, 1931, was 2.25, based on 68 deaths and an output of 30,260,000 tons. In November there were 89 deaths in mining 30,110,000 tons, giving a death rate of 2.96; 96 deaths in mining 40,222,000 tons gave a fatality rate of 2.39 in December, 1930.

In the anthracite mines of Pennsylvania, there were 25 deaths in December, 1931, in mining 4,671,000 tons, giving a death rate of 5.35. In the previous month the rate was 3.38, based on 14 deaths and an output of 4,141,000 tons, while in December a year ago the death rate was 4.96, based on a production of 6,050,000 tons and 30 fatalities.

During 1931, there were 1,430 deaths in and about all coal mines in the United States. With an estimated production of 437,641,000 tons, the death rate was 3.27 per million tons mined. The present total number of deaths probably will be increased slightly on account of some injuries in 1931 that had not proved fatal when the year closed, but with due allowance for this it is believed that the record for 1931 will still show the lowest death rate per million tons in the history of the coal-mining industry. For each fatal accident, as shown by present figures, there were 306,000 tons of coal mined. This production per death was 20 per cent larger than the corresponding output ten years ago.

There were five major disasters in 1931—that is, disasters in each of which 5 or more lives were lost. These five disasters caused 51 deaths. No disaster occurred in the month of December. During 1930, there were 12 major disasters in which 225 lives were lost. Based exclusively on these major disasters, the fatality rates per million tons of coal mined were 0.117 in 1931 and 0.419 in 1930. The major disasters in 1931 occurred at the rate of 1.14 separate disasters for each hundred million tons of coal produced, as compared with 2.24 in 1930.

Comparative fatality rates for 1930 and 1931 are as follows:

**Fatalities at United States Coal Mines and Death Rates per Million Tons in 1931 by Causes of Accidents**

| | 1930 | | | | | | 1931* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bituminous | | Anthracite | | —Total— | | Bituminous | | Anthracite | | —Total— | |
| Cause | Fatalities | Fatalities per 1,000,000 Tons | Fatalities | Fatalities per 1,000,000 Tons | Fatalities | Fatalities per 1,000,000 Tons | Fatalities | Fatalities per 1,000,000 Tons | Fatalities | Fatalities per 1,000,000 Tons | Fatalities | Fatalities per 1,000,000 Tons |
| All causes | 1,619 | 3.463 | 444 | 6.399 | 2,063 | 3.842 | 1,050 | 2.777 | 380 | 6.383 | 1,430 | 3.268 |
| Falls of roof and coal | 852 | 1.822 | 231 | 3.329 | 1,083 | 2.017 | 615 | 1.627 | 209 | 3.511 | 824 | 1.883 |
| Haulage | 285 | .610 | 40 | .577 | 325 | .605 | 196 | .518 | 44 | .739 | 240 | .548 |
| Gas or dust explosions: | | | | | | | | | | | | |
| Local explosions | 20 | .043 | 30 | .432 | 50 | .093 | 19 | .050 | 16 | .269 | 35 | .080 |
| Major explosions | 214 | .458 | ... | ..... | 214 | .399 | 46 | .122 | 5 | .084 | 51 | .117 |
| Explosives | 31 | .066 | 47 | .678 | 78 | .145 | 14 | .037 | 25 | .420 | 39 | .089 |
| Electricity | 63 | .135 | 8 | .115 | 71 | .132 | 62 | .164 | 3 | .050 | 65 | .149 |
| Miscellaneous | 154 | .329 | 88 | 1.268 | 242 | .451 | 98 | .259 | 78 | 1.310 | 176 | .402 |

*All 1931 figures preliminary and subject to revision.

## Coal-Mine Fatalities During December, 1931, by Causes and States

(Compiled by Bureau of Mines and published by *Coal Age*)

| State | Underground | | | | | | | | | | | | Shaft | | | | | Surface | | | | | | | Total by States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Falls of roof (coal, rock, etc.) | Falls of face or pillar coal | Mine cars and locomotives | Explosions of gas or coal dust | Explosives | Suffocation from mine gases | Electricity | Animals | Mining machines | Mine fires (burned, suffocated, etc.) | Other causes | Total | Falling down shafts or slopes | Objects falling down shafts or slopes | Cage, skip, or bucket | Other causes | Total | Mine cars and mine locomotives | Electricity | Machinery | Boiler explosions or bursting steam pipes | Railway cars and locomotives | Other causes | Total | 1931 | 1930 |
| Alabama | 1 | | | 3 | | | 1 | | | | | 5 | | | | | | | | | | | | | 5 | 4 |
| Alaska | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Arkansas | | | | | | | 1 | | | | | 1 | | | | | | | | | | | | | 1 | 1 |
| California, Idaho, and Nevada | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Colorado | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 2 |
| Georgia and North Carolina | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Illinois | 4 | | 1 | | | | 3 | | | | | 8 | | | | | | | | | | | | | 8 | 9 |
| Indiana | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 2 |
| Iowa | 1 | | | | | | | | | | | 1 | | | | | | | | | | | | | 1 | 2 |
| Kansas | 1 | | | | 1 | | | | | | | 2 | | | 1 | | 1 | | | | | | | | 3 | 0 |
| Kentucky | 4 | | | | | | 1 | | | | | 5 | | | | | | | | | | | | | 5 | 10 |
| Maryland | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Michigan | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Missouri | 1 | | | | | | | | | | | 1 | | | | | | | | | | | | | 1 | 1 |
| Montana | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| New Mexico | | | | | | | | | | | | | | | | | | | | 1 | | | | 1 | 1 | 5 |
| North Dakota | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Ohio | 3 | | | | 1 | | 1 | | | | | 5 | | | | | | | | | | | | | 5 | 1 |
| Oklahoma | | | 1 | | | | | | | | | 1 | | | | | | | | | | | | | 1 | 2 |
| Pennsylvania (bituminous) | 11 | | 2 | | | | | | | | | 13 | | | | | | | | | | | 2 | 2 | 15 | 20 |
| South Dakota | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Tennessee | 2 | | | | | | | | | | | 2 | | | | | | | | | | | | | 2 | 1 |
| Texas | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Utah | 1 | | | | | | | | | | | 1 | | | | | | | | | | | | | 1 | 2 |
| Virginia | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 2 |
| Washington | | 2 | | | | | | | | | | 2 | | | | | | | | | | | | | 2 | 0 |
| West Virginia | 6 | 3 | 6 | | | | | | | | | 15 | | | | | | | | | | | | | 15 | 30 |
| Wyoming | 1 | | | | | | | | | | | 1 | | | | | | | | | | | | | 1 | 2 |
| Total (bituminous) | 36 | 5 | 10 | 3 | 2 | | 7 | | | | | 63 | | | 1 | | 1 | | | 1 | | | 3 | 4 | 68 | 96 |
| Pennsylvania (anthracite) | 8 | 8 | 3 | | 3 | | 1 | | | | 2 | 25 | | | | | | | | | | | | | 25 | 30 |
| Total, December, 1931 | 44 | 13 | 13 | 3 | 5 | | 8 | | | | 2 | 88 | | | 1 | | 1 | | | 1 | | | 3 | 4 | 93 | ... |
| Total, December, 1930 | 56 | 14 | 24 | 5 | 8 | 1 | 4 | | 3 | | 4 | 119 | 1 | | 1 | | 2 | | | 2 | | 1 | 2 | 5 | | 126 |